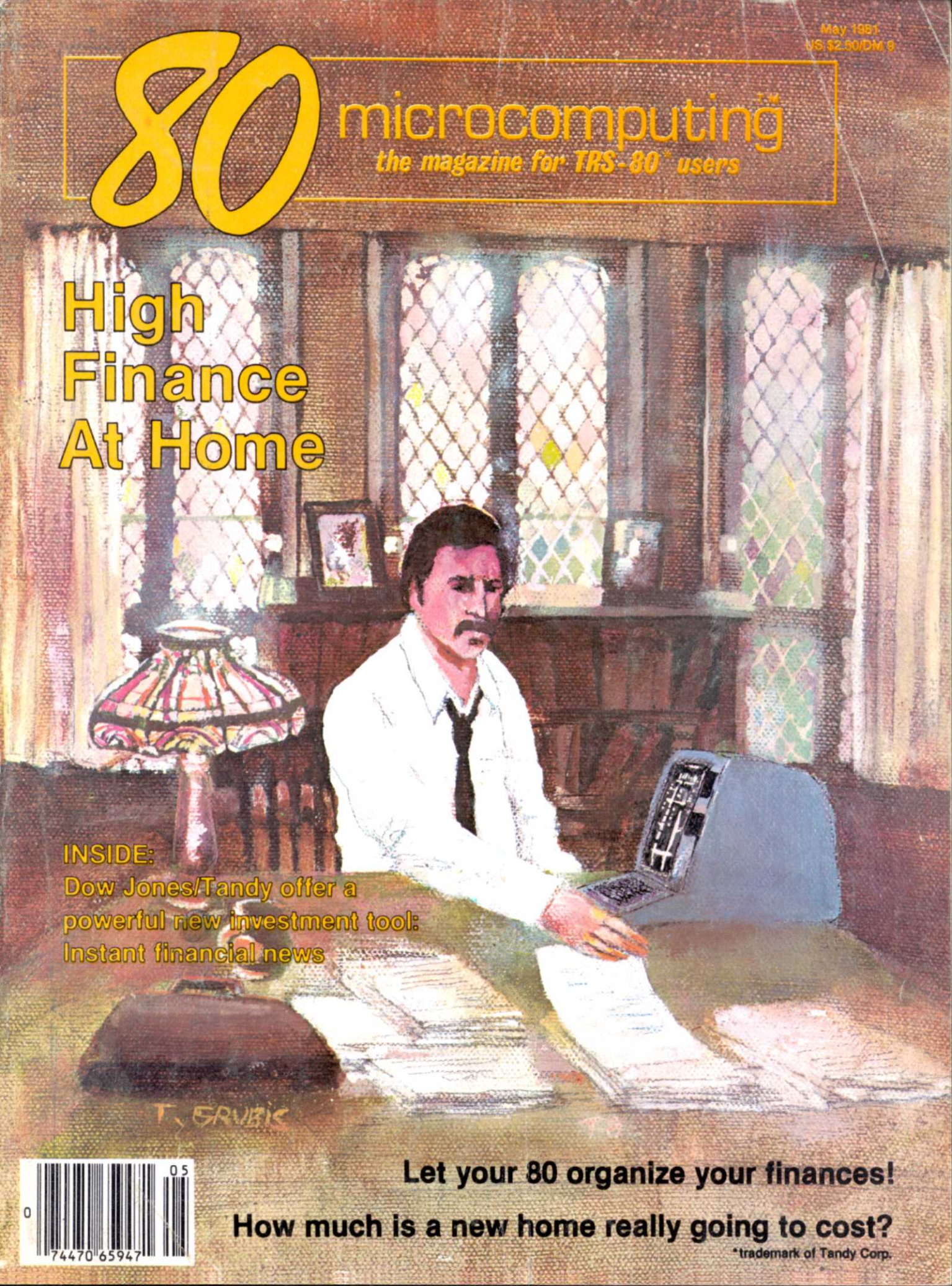
May 1981
US $2.50/DM 9

80 microcomputing™

the magazine for TRS-80 users*



High Finance At Home

INSIDE:
Dow Jones/Tandy offer a powerful new investment tool: Instant financial news

Let your 80 organize your finances!

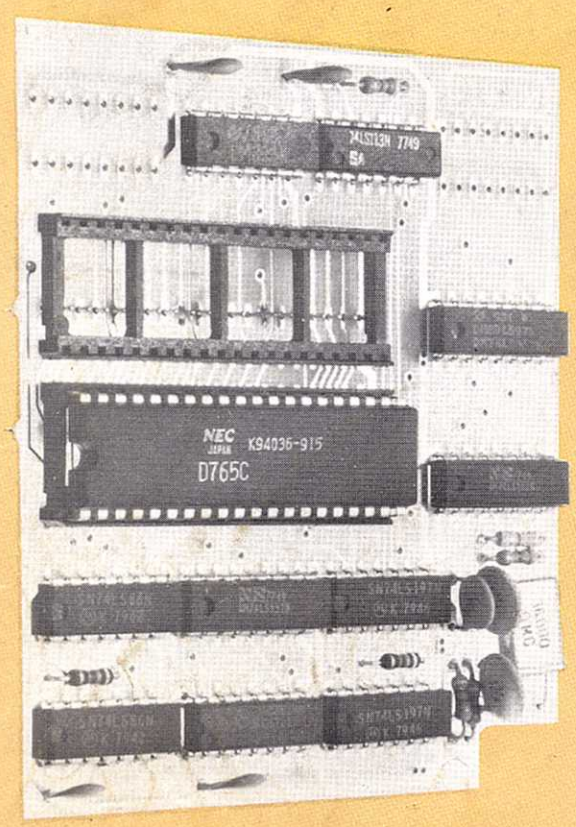
How much is a new home really going to cost?

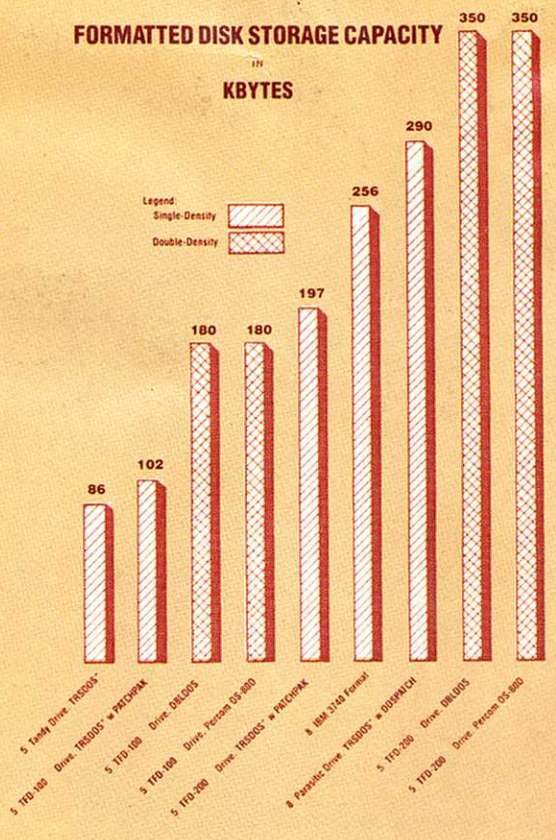
*trademark of Tandy Corp.

0 74470 65947 05

TRS-80* Model I Computer Owners . . .

Store Up to 350 Kbytes on a 5" Disk





The DOUBLER™. It packs almost twice the data on a disk track as your single-density system. Depending on the type of drive, you can store up to **four** times more data on one side of a minidiskette than you can store using a standard Model I mini-disk drive.

- The DOUBLER™ reads, writes and formats **either** single- or double-density minidiskettes.
- Proprietary design allows you to continue to run TRSDOS*, NEWDOS‡, Percom OS-80™ or other single-density software **without making any changes** to software or hardware. Switch to double-density operation at any convenient time.
- Includes DBLDOS™, a **TRSDOS* compatible** double-density disk operating system.
- CONVERT utility, on DBLDOS™ minidiskette, converts files and programs from single- to double-density or double- to single-density.
- The DOUBLER™ circuit card **includes high performance data separator, write precompensation** circuits for reliable disk read operations — even with 80-track drives.
- **Plug-in Installation** — The DOUBLER simply plugs into the disk controller socket of your Expansion Interface, requiring no strapping or trace cutting. Expansion Interface disk controller may be completely restored to original configuration by simply removing the DOUBLER™ and re-installing the original disk controller chip.
- Works with standard 35-, 40-, 77- and 80-track mini-disk drives rated for double-density operation.
- Introductory price, including DBLDOS™ and format conversion utility on minidiskette, **only** $219.95.

Mini-Disk Systems

More storage capacity, higher reliability — from Percom, the industry leader. One-, two- and three-drive configurations in either 40- or 77-track format. Fully burned-in. From only $399.

Double-Density Software

(On diskette — with instruction manual.)

OS-80D™ Double-Density Disk Operating System — This double-density upgrade version of Percom's acclaimed OS-80™ resides *entirely* in RAM — requiring only 7.5-Kbytes! A BASIC programmer's "dream operating system," even utilities are in BASIC.

DOUBLEZAP-II/80 This program modifies Apparat's NEWDOS/80‡ to run either double — or single-density programs — even to run a mix of the two formats on one system!

DOUBLEZAP-II/V This program modifies Virtual Technology's VTOS 4.0†† to provide the same capability as DOUBLEZAP-II/80 provides for NEWDOS/80.

Call toll-free, **1-800-527-1592**, for the address of your nearest authorized Percom dealer, or to order directly from Percom.

PERCOM

PERCOM DATA COMPANY, INC.
211 N. KIRBY GARLAND, TEXAS 75042
(214) 272-3421

™ trademark of Percom Data Company, Inc.
* trademark of Tandy Radio Shack Corporation which has no relationship to Percom Data Company.
‡ trademark of Apparat Company, Inc. ††trademark of Virtual Technology, Inc.

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
PRICES DO NOT INCLUDE SHIPPING AND HANDLING CHARGES.

Percom Mini-Disk Drive Systems for TRS-80* Computers...

Now! Add-On *and* Add-In Mini-Disk Storage for your Model III.

The industry leader in microcomputer peripherals, Percom not only gives you better design, better quality and first-rate service, but you pay less to *boot*.

New for the TRS-80* Model III

Patterned after our fast-selling TFD Model I drives. And subjected to the same reliability controls. These new TFD mini-disk systems for the Model III provide more features than Tandy drives, yet cost far less.

- **Flippy Capability:** Both internal (add-in) and external (add-on) drives permit recording on either side of a diskette.
- **Greater Storage Capacity:** Available with either 40- or 80-track drive mechanisms, Percom TFD mini-disk systems store more. A 40-track drive stores up to 180 Kbytes — formatted — on one side of a 5-inch diskette. An 80-track drive stores a whopping 364 Kbytes.
- **1.5 Mbyte On-line:** The Percom drive controller (included with the initial drive) handles up to four drives. With four 80-track mini-disk drives you can access over 1.5 million bytes of on-line file data.
  Moreover, the initial drive may be **either** an internal add-in drive or an external add-on drive. And whichever configuration you get, the initial drive kit comes complete with our advanced 4-drive controller, interconnecting cables, power supplies, installation hardware, a DOS and of course the drive mechanism itself.
- **First Drive Includes DOS:** OS-80™, Percom's fast extendable BASIC-language disk operating system, is included on diskette when you purchase an initial drive kit. Originally called MicroDOS, OS-80 was favorably reviewed in the June 1980 issue of Creative Computing magazine.
- **Works with Model III TRSDOS:** Besides being fully hardware compatible, Percom's Model III 40-track drive systems may be operated with Tandy's Model III TRSDOS — without any modifications whatsoever. And, TRSDOS may be easily upgraded with simple software patches for operating 80-track drives.

Percom TFD add-on drives start at only $399. Model III Drive kits start at only $749.95.

Quality Percom products are available at authorized dealers. Call *toll free 1-800-527-1592* for the address of your nearest dealer or to order direct from Percom.

Still #1 for Model I

As if greater storage capacities, exceptional quality control measures and lower prices aren't reasons enough to make Percom your first choice for Model I add-on drives, **all** Percom Model I drives are also rated for double-density operation.

Add our innovative DOUBLER™ adapter to your Model I Expansion Interface, and with Percom drive systems you can enjoy the same double-density storage capability as Model III owners.

The DOUBLER includes a TRSDOS*-like double-density disk operating system called DBLDOS™

We also offer a double-density Model I version of OS-80 as well as DOUBLEZAP programs for modifying NEWDOS/80 and VTOS 4.0† for DOUBLER compatibility.

Of course you don't have to upgrade your computer for double-density operation to use Percom mini-disk drive systems. In single-density operation, our TRS-80* Model I compatible 40-track drives store 102 Kbytes of formatted data on one side of a diskette, and our 80-track drives store 205 Kbytes. By comparison, Tandy's standard drive for the Model I stores just 86 Kbytes.

And like our Model III drives, Model I add-on drives are optionally available with "flippy" storage capability.

System Requirements:

Model III: 16-Kbyte system (min) and Model III BASIC. The second internal drive may be installed after the first internal drive kit is installed, and external drives #2, #3 and #4 may be added if either an internal or external first-drive kit has been installed. External drives #3 and #4 require an optional interconnecting cable.

Model I: 16-Kbyte system (min), Level II BASIC, Expansion Interface, disk operating system and an interconnecting cable. For double-density storage, a Percom DOUBLER must be installed in the Expansion Interface and DBLDOS (comes with the DOUBLER) or other double-density DOS must be used. For single-density operation, a Percom SEPARATOR™ adapter, installed in the Expansion Interface, will virtually eliminate "CRC ERROR — TRACK LOCKED OUT" read errors. Prices and specifications subject to change without notice.

PERCOM

✓ 408

PERCOM DATA COMPANY, INC.
211 N. KIRBY GARLAND, TEXAS 75042
(214) 272-3421

*Trademark of Tandy Radio Shack Corporation which has no relationship to Percom Data Company.
™DOUBLER, DBLDOS, OS-80 and SEPARATOR are trademarks of Percom Data Company, Inc.
†Trademark of Virtual Technology Corporation.

80 Contents

PUBLISHER
Wayne Green

EXECUTIVE VICE PRESIDENT
Sherry Smythe

CORPORATE CONTROLLER
Charles Garniss, Jr.

ASSOCIATE PUBLISHER
Edward Ferman

ASSISTANT PUBLISHER
Jeff DeTray

ADVERTISING MANAGER
Kevin Rushalko

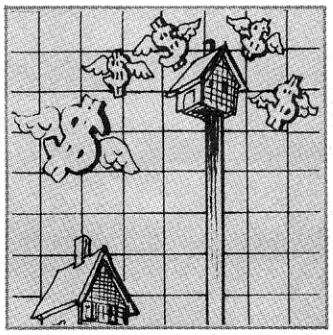
CIRCULATION MANAGER
(603) 924-7296
Debra Boudrieau

BULK SALES MANAGER
Ginny Boudrieau

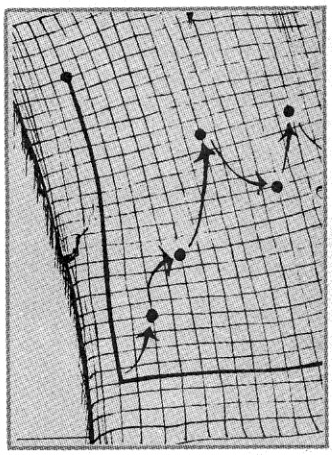
ASSISTANT TO PRESIDENT
Matt Smith

ADVERTISING SALES
(603) 924-7138
Penny Brooks
John Gancarz

The Auto Mentor 87
by Leslie E. Sparks
Car maintenance eroding your bottom line? Here are all the answers you need to decide whether to buy a new car or stick with your old one. Find out how much your old car is costing you, then compare it with the cost and mileage of that lovely new machine.

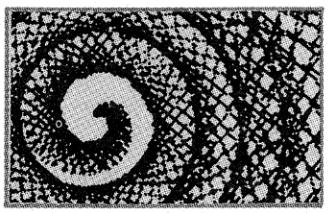


The Home Buyer's Helper 99
by Clarence Stinson
This article turns your 80 into a home buyer's calculator that will calculate the differences in interest paid on mortgages, cash needed monthly to make the payments, and appropriate IRS rebates. Pay through your 80, it feels better.



How to Buy and Sell Houses 103
by Dale A. Whitman
Whitman takes a look at home buying from both sides of the coin. This article may convince you that there is a better way to finance than through the banks.

A Dollar Down 113
by Jack Martin
This article tells you much more about a new car than kicking the tires will, and it doesn't indulge in a sales pitch, either. Drag your eyes away from the shiny new paint and train them on your shiny 80; you may discover there is a better deal to be had.



Part II 119
Advanced Graphics Techniques
by Bob Boothe
In this second part of a three-part series, Boothe really struts his stuff and makes the 80 do all but cartwheels with some truly incredible graphics. You may not recognize your 80.

The Exclusive Oracle 58
by Dennis Kitsz
Kitsz begins a new feature with this issue, which will prove to be as irregular as he is. Want to question the wizard? Here's the medium.

Dow Jones Offers Videotex Tie-in 64
by Bert Latamore
Dow Jones has made its business and stock market news information service available for all TRS-80 owners, including the Color Computer. Latamore has all the specs; this could prove to be very important to your business.

DEPARTMENTS

7 **Remarks** *Wayne Green*
8 **Inside 80** *Ed Juge*
12 **80 Input**
26 **Reviews**
38 **The Assembly Line** *William Barden, Jr.*
44 **80 Accountant** *Michael Tannenbaum*
48 **80 Applications** *Dennis Kitsz*
54 **Education 80** *Earl R. Savage*
58 **The Exclusive Oracle** *Dennis Kitsz*
64 **News**
73 **New Products**
306 **Reader Service**

Manuscripts are welcome at *80 Microcomputing*, we will consider publication of any TRS-80 oriented material. Guidelines for budding authors are available, please send a self-addressed envelope and ask for "How to Write for *80 Microcomputing*." Entire contents copyright 1981 by 1001001 Inc. No part of this publication may be reprinted, or reproduced by any means, without prior written permission from the publisher. All programs are published for personal use only. All rights reserved.

80 Microcomputing (ISSN -0199-6789) is published monthly by 1001001 Inc., 80 Pine St., Peterborough NH 03458. Phone: 603-924-3873. Subscription rates in U.S. are $18 for one year and $45 for three years. In Canada, $20—one year only, U.S. funds. Canadian distributor: Micro Distributing, 409 Queen St. West, Toronto, Ontario, Canada M5V 2A5. Foreign subscriptions (surface mail), $28—one year only, U.S. funds. Foreign subscriptions (air mail), $60—one year only, U.S. funds. In Europe contact Monika Nedela, Markstr. 3, D-7778 Markdorf, W. Germany. In South Africa contact *80 Microcomputing*, P.O. Box 782815, Sandton, South Africa 2146. Australian Distributor: Electronic Concepts, Attention: Rudi Hoess, 55 Clarence Street, Sidney 2000, Australia. All U.S. subscription correspondence should be addressed to *80 Microcomputing*, Subscription Department, P.O. Box 981, Farmingdale, NY 11737. Please include your address label with any correspondence. Postmaster: Send form -3579 to *80 Microcomputing*, Subscription Services, P.O. Box 981, Farmingdale, NY 11737.

APPLICATIONS

128 **Dome Time** If you've always wanted your own sphere. *Daniel B. Nickell*
219 **Foreign Language Translation** You can finally make sense of your relatives. *Dan L. Robinson*

BUSINESS

222 **The General Ledger** Get your business on cassette. *R. L. Conhaim*

CONSTRUCTION

80 **High Density Graphic Interface—Part Two** Installing high-res. *Dennis Murray and Paul Fowler, Jr.*
202 **Hardwire the RS-232** Get to bed earlier, with this one. *Don DeJarnette*
254 **An Alternate Source** International computing. *John G. Conner*

EDUCATION

194 **Dancin!—A Disco Primer** Byte off some boogie. *Andrew A. Modla*

GAME

294 **BOA** Get into a snakepit. *Jeff Myers*

GENERAL

192 **Hardtimes** Variables maps and other tools. *Joe Fettig*
208 **A Field Guide to Computerists** Check out these birds. *Chuck Doherty*
258 **Speedset** Rid yourself of read/write errors. *Sherman B. Winings*
272 **The Sargon Saver** If you have to work for a living. *Thomas L. Quindry*

GRAPHICS

176 **Inverse Video** Turn black to white. *Brian D. Smith*
204 **Flexible Scroller** Roll your own. *Jeff Myers*

HARDWARE

188 **Keep It in the Black** For tired printers. *William D. Johnson*
236 **The Pulse Jockey** Software and trickery to make things simple. *Larry Suter*

PERSONAL

276 **Computerized Complaint** For Input page addicts. *Dennis J. Gillig*

REVIEW

158 **FORTRANslator** A review and caveat. *Richard C. McGarvey*
206 **Editor/Assembler-Plus** Good stuff for 16K Level II. *Dan Zuckerman*
210 **Microsoft's Compiler for the Model II.** A handy language-changer. *James L. Waggoner*
230 **LNW Research Expansion Board** Helps your 80 work hard. *Ian Hodgson*
242 > **22 MHz for $99** Give your 80 a monitor boost. *Fredi Egger*
266 **The FCI-80 and the TC-80** Cassette prodders. *Harley Dyk*
296 **Talk to Your TRS-80** Betcha didn't know it had a voice. *Art Welcher*

TECHNIQUE

246 **Not-So-Random Numbers** Create charts out of chaos. *Timothy R. Zeigler*

TUTORIAL

146 **Memories Are Made of This** Make a routine out of RAM and ROM. *Robert D. Randall*
168 **An Idiot's Guide to Assembly Language—Part I** From one struggling idiot to another. *Robert C. Montgomery*
292 **On the Average** About an average subject. *Len Gorney*

UTILITY

190 **Direct Statement in File** Save your overworked fingers. *D. E. Fitchhorn*
216 **Dollars and Sense** A subroutine for getting down to business. *Tom Andrews*
234 **The Encoder** An easier way. *Ron Cain*
244 **Hex Converter** Turn a nightmare into a treat. *Richard H. Malone*
256 **One Wheel Drive** Turn your jalopy into a sedan. *Dan Keen and Larry Pezzuto*
260 **Shift Lock** A subroutine to give you short shift. *Martin C. Hambel*
264 **The Spare Time Generator** For those with long lists of names. *Thomas C. Mehesan, Jr.*
270 **Comprs** Help for short memory hindrances. *Stephen Barker*
284 **Take T-Bug Higher** Without a pilot's license. *W. R. Stanley*
288 **Know-It-All** Everything you wanted to know, but were afraid to ask. *Alan Sehmer*

PUBLISHER/EDITOR
Wayne Green

MANAGING EDITOR
Michael Comendul

TECHNICAL CONSULTANT
Jake Commander

PRODUCTION EDITOR
Bob Dukette

NEWS EDITOR
Bert Latamore

REVIEW EDITOR
Pamela Petrakos

ASST. TECHNICAL EDITOR
Chris Brown

ASSISTANT EDITORS
Lise Markus
Debra Marshall

TECHNICAL CONTRIBUTING EDITOR
Dennis Kitsz

EDITORIAL ASSISTANT
Janet Fiderio

EDITORIAL ADMINISTRATION
Pat Graham
Nancy Noyd

DESIGN ASSOCIATE
Diana Shonk

PRODUCTION MANAGER
Nancy Salmon

ASST. PRODUCTION MANAGER
Michael Murphy

AD GRAPHICS MANAGER
Robert Drew

AD COORDINATOR
Sue Symonds

ADVERTISING PRODUCTION
Steve Baldwin, Bruce Hedin, Maryann Metivier

PRODUCTION DEPT.
Joan Ahern, Fiona Davies, Linda Drew, Frances Benton, Kenneth Jackson, Ross Kenyon, Theresa Ostebo, Jane Preston, Thomas Villeneuve

PHOTOGRAPHY
William Heydolph, Terrie Anderson, Bill Suttenfield

TYPESETTING
Barbara Latti, Sara Bedell, Michele Desrocher, Luann Keddy, Mary Kinzel, Linda Locke, Karen Stewart

Cover by Tom Grubis

MODEL III* for 320.00

PROGRAMS AVAILABLE NOW FROM MICRO-SYSTEMS SOFTWARE INC.

MODEL III DOSPLUS READY NOW! That's right! DOSPLUS 3.3 for the MODEL III is available now. We have our MODEL III, and now you can have our DOS. All the great features of our popular MODEL I DOS, plus Single or Double Density Operation. The best gets better! Order now, and soon your MODEL III will be all the computer it can be. Experience excellence. Experience DOSPLUS. **Introductory Offer $49.95**

DOSPLUS 3.2 or 3.2D The flagship of the Micro-Systems line. This is the BEST disk operating system currently available. It offers you all the features you could ever use, speed, reliability, and much more! Full support of variable length records. No more internal errors during file handling due to poorly written operating systems. Allows use of ISAM technique. Supports 35-80 track drives. The two operating systems are basically the same. However, Dosplus 3.2D will operate double density. The double density DOS has some differences peculiar to double density operation. Both systems offer DOS commands from BASIC, BASIC renum, and BASIC program compressor. DOS utilities include a sector display/modify program, a utility to purge files, AND a utility to restore purged or killed files. Free space map and the most comprehensive directory on the market. Try it and you'll never use anything else. All this and much more for only **$99.95** either system.

DISKZAP 2.3 A single or double density disk editor. Works with any number of tracks. It is track and sector oriented, and offers total access to all parts of the diskette. It has it all. It will even include a disk formatter. With DISKZAP 2.3 it is even possible to convert your single density disks to double density. Priced at only **$19.95** for Model I or III

MASTER DISK DIRECTORY 1.1 One of the most useful programs ever conceived. It will read the directories of up to 320 diskettes (or 5000 files). You can then search for a disk name, a filespec (or piece of a filespec), free space, or an extension. No more looking for programs that are "around here somewhere." Master directory will read any diskette directory, works to either the video or the line printer, will operate on either single or multiple drive systems, and is now available in Spanish. Retail price is **$29.95.**

ACCOUNTS RECEIVABLE 1.0 (including inventory package) A point of sale, invoice-generating and based accounts receivable program. Including INVCO 1.3 (a comprehensive manufacturing inventory program), this program will meet the specialized needs of almost anyone engaged in the wholesale or distributing business. The fastest and best program of it's type available anywhere. Requires a Model I, 32K, twin drive system. Also requires DOSPLUS 3.2. For speed, accuracy, and convenience, it can't be beat! Price quoted on request due to the custom configuring necessary in any business software.

SUPERBAK Any disk that will boot-up in your computer, this program will back-up. It will scan any disk created by the TRS-80 Model I, and create an exact copy of the disk. Retail price is **$19.95.** Single density only.

MOTHER PACKER A string packing graphics generator for the TRS-80 Model I. Offers you graphics like you never thought you'd have. Draw maps, reports, anything, with lightning speed. Re-draw the screen so fast that you can present the illusion of continuous motion. Cost is only **$9.95** on cassette. **$19.95** on disk.

***2.2 meg** on Model I with our Doubler Board and Drives. Blank 5¼" Diskettes

VISA

master charge

Micro Systems Software Inc. ✓384

Specializing in the Tandy Line

MS INC.

(305) 983-3390

5846 Funston Street
Hollywood, FL 33023

CALL TOLL FREE FOR FAST SERVICE
(800) 824-7888, OPERATOR 193
FOR VISA/MASTERCHARGE/C.O.D. ORDERS
California dial (800) 852-7777, Operator 193
Alaska and Hawaii dial (800) 824-7919, Operator 193
TOLL FREE LINES WILL ACCEPT ORDERS ONLY!
For Applications and Technical information, call (305) 983-3390 or drop us a card.

Dealers inquiries invited

80 REMARKS

by Wayne Green

"Before we can accept the computer we may have to adjust to a fact of life: It is not our responsibility to force-feed education to children."

When I went to high school, some 40 years ago, it was enjoyable. I went to one of the best schools in Brooklyn, New York, Erasmus High School. It was beautiful. The "old school" stood in the center of a block long (and the block was very long) quadrangle of the new building, which rose three stories and looked like an enormous castle. During my tour at Erasmus we celebrated its 150th anniversary.

One of the features I enjoyed the most about the school was the wide choice of after-school clubs to which I could belong, —over 120. There weren't enough afternoons in a week to participate in all of them.

The most prestigious of the clubs was the Choral Club, which practiced daily during the second period. Erasmus gave every student a voice test, and the top one hundred voices were able to join this club. The school had about 10,000 students, so it was quite an honor to be selected. I'd been singing several years in a church choir as a soprano, so I had no difficulty in getting into this group with my newly developed baritone voice. We sang daily and gave concerts quite regularly.

One of the other clubs that I enjoyed was the ham club (W2ANU), one of the oldest in the country. There I was able to learn more about amateur radio and operate the club ham station. Then, there was the Savoyards, a club dedicated to singing Gilbert and Sullivan operettas. I still know several of them almost word for word.

On Tuesday afternoons I went to the camera club. Do you know how long ago that was? Well, I remember going over the very first issue of *Life* magazine. Imagine, a magazine based on photographs... what excitement for a camera group!

Not long ago I saw a TV program about Erasmus on one of the news specials. It is now classed as the most dangerous school in New York! It takes a special school police force to keep crime down to "acceptable" levels. It is an armed camp.

Other recent television stories confirm the plight of teachers and of those students wishing to learn. Classes are a shambles. It is getting almost impossible to teach because an ever increasing number of students have lost interest and are distracted by those youngsters who are there against their will. It is demoralizing for teachers, who are deserting the field by the thousands.

Undisciplined Students

Apparently no one has been able as yet to figure out any answer to this situation. I know what it's like to have even a couple of undisciplined students in a class. I ran into that in grammar school in Brooklyn. I don't think any of my classmates will ever forget Myron Nussbaum or Norman Golding (those are the true names, so sue me for libel), who spent each day trying to make life miserable for our teacher. They got up when they felt like it, yelled at her, then tossed erasers at her, as she chased them around the classroom. The school principal couldn't do anything either. Apparently their families didn't care. So we lived with it, were amused by it... and hated it.

Perhaps the computer comes to education just in time. Before we can accept the computer we may have to adjust to a fact of life: It is not our responsibility to force-feed education to children. Isn't it enough that we make it available?

We're a prisoner of our past in much of this. Schools developed for good reasons, but they evolved into giant baby-sitting systems for most families. Summer vacations may have been a blessing for the kids, but many mothers sighed when they came.

I believe that eventually we will provide a better quality of education by means of computerized teaching than is currently available in most schools. Truly interesting courses can be taught by some of the best teachers in the world. The computer, as I've written before, can control the speed of the teaching process, gearing it to the interest and intelligence of the student.

Once we have developed better learning systems, not dependent upon live teachers for other than minor support and advice, it may be possible to move these systems into the home. This may be a healthy change for society and result, in the long run, in more highly motivated children.

But what has brought such a radical change to Erasmus High?

Many factors have transformed schools over the last forty years. We can certainly point to the almost standard family with two working parents, a necessity just to meet payments for homes and food, but which has removed the influence of the mother from our children after school.

Worse, the ubiquitous television and its continuously violent offerings not only claims our children's attention, but almost totally occupies the parents in the evening too. This removes the chances for any serious communication between parents and children.

Add to this the doctrine of Dr. Spock and the "let the children do what they want" attitude, and we may have the roots of the lack of respect and the vandalism which is now engulfing us.

Police Protection

When I see movies of teachers trying to cope with children who are uninterested in learning, I wonder that these teachers aren't lobbying harder for computers to help them with their thankless jobs. With computers for each student there would be less opportunity for students to create havoc, throw erasers (there will be no more erasers), or molest the teachers. At Erasmus teachers have police protection walking around the halls.

One of the problems of compulsory education is not only that it forces children to be in school but that it also acts upon the teachers, who address captive audiences, and thus have no responsibility to make the work interesting.

In my four damned years of college I had only one teacher who made an effort to make his classes interesting, and he succeeded. Every student enjoyed his accounting class...and *learned*, because the course was fun and exciting. Imagine a subject as dry and dusty as accounting being fun! The rest of the classes stunk. I

Continues to page 10

INSIDE 80

by Ed Juge, director of computer merchandising, Tandy Radio Shack

". . . your ideas and opinions . . . are very important to us. We appreciate hearing your thoughts."

Sincere thanks to all of our friends who have written the last couple of months. We appreciate your input. I've answered as many of your letters as time allowed, passed some on to Bill Walters, and some to the appropriate product managers for reply. Those suggestions you made *did* get into the appropriate hands.

Occasionally I'm asked why I talk about products before they're actually available, or say something which readers know, when they read it, is not true. This week, by phone, came the best suggestion of all: Why don't I explain both of these concerns every couple of months for those who haven't followed the column regularly.

It's relatively simple: In an early column we said that we would be as up front with you as possible, even at the risk of being proven wrong, or having a discussed product delayed, etc. I said we'd try it, but that readers would have to allow a fudge factor for Murphy's law, which would surely take its toll. All in all, it's worked well. However, there are a few folks that have really gotten bent out of shape at unintentional inaccuracies.

The second factor is that the column for each issue is written some three months prior to the cover date. Unless the facts of the subject look pretty stable, I normally do not mention them, but even those appearing certain can fall through the cracks. So, now you know how the inaccuracies happen.

Next, I owe all of you an apology. With the appearance of the March issue of *80*, a call came in asking about the "color computer accessory" I promised to talk about in March. Well, I blew it! I'll try to be more careful in the future.

TRS-80 Microcomputer News

Believe it or not, we still get letters almost daily from disgruntled customers who aren't getting the *TRS-80 Microcomputer News*. Or from those who are disgusted about having to pay for it after the first twelve free issues (some of you didn't even get them). I've probably written several hundred personal letters on the subject. I've mentioned it here twice, and it's been on CompuServe, with the hope of getting the word around by hearsay to those not getting the publication.

Your name is placed on the mailing list on our big computer system, dated from the card which came with your computer. If you thought sending in this card as registering your warranty, forget it! Radio Shack warranties products based on the date on your original sales ticket and nothing else. The only reference made to that card is for the purpose of mailing newsletters and special computer information to you. If you thought you were extending your equipment warranty by delaying mailing it, you're in for a big surprise. If you didn't want to invest in an 18 cent stamp, you really didn't want the *News*, and I can't feel sorry for you.

If you didn't get a card, we can register you from a written request and a photostat of your original sales ticket, showing purchase of a new computer (CPU only) from any authorized Radio Shack outlet. But if you try to get on the mailing list a second time, don't bother. . . our computer remembers you, and knows whether or not you've had your 12 labels run already. It also knows whether two separate purchases were involved, entitling you to 24 months, etc.

Unauthorized Dealers and The Black Hole

Remember, there are some unauthorized folks out there selling new TRS-80's. If you bought from them, their sales ticket means nothing to us. If you didn't get a free newsletter card from them, talk to them. . . not us. Maybe they'll buy you a $12.00 subscription.

Let's assume you get properly registered into our computer system as a new owner. We print labels for 12 copies of *Microcomputer News*, following your registration. They're affixed to newsletters, and delivered to the post office. The mailing service returns any labels "eaten up" by the automatic labeling equipment, and we duplicate them. This is to ensure that everybody on the list has a newsletter delivered to the post office. That's all we can do. If yours gets lost in a USPS black hole, the only solution may be to subscribe. Paid subscribers are mailed first class, rather than the bulk mail used for the free copies. First class seems to somehow effectively circumvent the black hole.

Sorry, we can't send the newsletter free forever, nor can we keep sending it until you've managed to receive twelve copies. As a matter of fact, our two largest competitors in the small computer market include one who publishes no newsletter at all, and one who charges you from issue number one! Consequently, I don't feel our policy is all that bad. You'll also find that our newsletter is no longer just an advertising sheet as it originally was. We make new product announcements, along with in-depth product descriptions, but there's no outright advertising at all.

Sorry Again

Sorry again, but we do not have a significant supply of back issues! In fact, many of the back issues are no longer available, so save yourself and us some time and don't bother asking for them.

Level II Teaching Book Available

You've been asking for this one for only about two and a half years now. I hope it's better late than never! Written in-house, it's entitled *Getting Started With TRS-80 BASIC*, and is priced at $6.95.

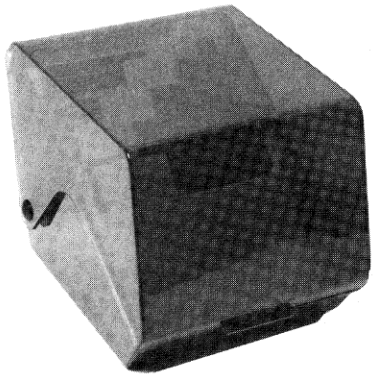
It applies equally to both Level II and Model III BASIC and is written in the same style as our original Level I training manual.

There are three parts to the book. Part one is for the absolute beginner, the first-time user, who has only just found the on/off switch. Part two takes full-swing into the language and part three goes into some of the more advanced concepts and commands including PEEK and POKE, graphics, error-handling, formatted printing, etc. There are exercises, sample programs, tables and charts, and of course a complete index (342 pages in all). If you're already a proficient programmer, you'll want this book as a reference for your Model I or III; even Model II owners will find it most useful. It is also a valuable reference guide for other family members

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132
CALL TOLL FREE 1-800-321-3552 TO ORDER
IN OHIO, call (216) 289-7500 (COLLECT)

FILE BOX
DISKETTE STORAGE SYSTEM



$24.95 for 5¼" disks
$29.95 . . . for 8" disks

MTC brings you the ULTIMATE diskette storage system, at an affordable price. Storing 50 to 60 diskettes, this durable, smoke-colored acrylic unit provides easy access through the use of index dividers and adjustable tabs. Unique lid design provides dust-free protection and doubles as a carrying handle.

'RINGS' & THINGS

Help prevent data loss and media damage due to improper diskette centering and rotation with the FLOPPY SAVER™ reinforcing hub ring kit. 7-mil mylar rings install in seconds. Kit is complete with centering tool, pressure ring, 25 adhesive backed hub rings and instructions.

HUB RING KIT for 5¼" disks. $10.95
HUB RING KIT for 8" disks. $12.95
REFILLS (50 Hub Rings) . . . . . $ 5.95

Protect your expensive disk drives and your valuable diskettes with our diskette drive head cleaning kit. The kit, consisting of a pair of special "diskettes", cleaning solution and instructions, can be used for 52 cleanings. Removes contamination from recording surfaces in seconds without harming drives.

CLEANING KIT for 5¼" drives . . . $24.95

PLASTIC LIBRARY CASES
(not shown)

An economical form of storage for 10 to 15 diskettes, and is suitable for your bookshelf! Case opens into a vertical holder for easy access.

5¼-inch diskette case $3.50
8-inch diskette case $3.95

Single Sided, Soft-Sectored 5¼-inch, (for TRS-80™) Mini-floppy

DISKETTES
$21.95 box of 10

These are factory fresh, absolutely first quality (no seconds!) mini-floppies. They are complete with envelopes, labels and write-protect tabs in a shrink-wrapped box.

PLAIN JANE™
DISKETTES
The Beautiful Floppy
with the Magnetic Personality™

Thousands of people have switched to this low-cost alternative. These quality diskettes are packaged in a plain white box . . . no fancy printing, fancy names or fancy labels, not even our own (labels cost money). Trust us.

PLAIN JANE™ Diskettes $21.95
10 boxes of 10 . . . . (each box) $21.50

PLAIN JANE™ *Gold*

Introducing MTC's premium generic diskette. Single-Sided, Soft-Sectored, DOUBLE-DENSITY, 5¼-inch diskettes with reinforcing HUB-RINGS. Individually 100% ERROR-FREE certified. Invest in GOLD!

PLAIN JANE™ *Gold* $25.95

VERBATIM'S PREMIUM DISKETTES AT AFFORDABLE PRICES

DATALIFE™

Seven data-shielding improvements mean greater durability and longer data life. These individually, 100% error-free certified diskettes feature thicker oxide coating, longer-lasting lubricant, improved liner, superior polishing and more! Meets or exceeds IBM, Shugart, ANSI, ECMA and ISO standards. Reinforcing HUB RINGS help prevent data loss and media damage, reducing errors.

Buy the best . . . buy DATALIFE™

VERBATIM DATALIFE™ DISKETTES
5¼-inch (box of 10)
MD525-01 . . . . . $26.95
10 boxes of 10 . . . . (each box) $25.95

8-inch FLOPPIES
Double-Density, FD34-8000 . $43.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" PLAIN JANE™ *Gold* $25.95
5¼" DATALIFE™ MD 525-01 . . $26.95
8" DATALIFE™ FD34-8000 . . . . $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS + to
NEWDOS/80 UPGRADE . . . . . CALL
NEWDOS + with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES . . $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER . . . . $ 7.95

Let Your TRS-80™ Test Itself With

THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

by THE MICRO CLINIC

A complete checkup for your Model I. THE FLOPPY DOCTOR completely checks every sector of 35- or 40-track disk drives. Tests motor speed, head positioning, controller functions, status bits and provides complete error logging. THE MEMORY DIAGNOSTIC checks for proper write/read, refresh, executability and exclusivity of all address locations. Includes both diagnostics and complete instruction manual.

SYSTEM DIAGNOSTICS $19.95

An improved version of the SYSTEM DIAGNOSTICS above. Designed for single or double density, 35-, 40-, 77-, or 80-track disk drives. Includes new and modified tests. Features THE FLOPPY DOCTOR, Version 3.0.

SYSTEM DIAGNOSTICS-V3 . . $24.95

MORE PRODUCTS →

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
©1981 by Metatechnologies Corporation, Inc.

✓20

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT May 1, 1981 THRU May 31, 1981,

Prices, Specifications, and Offerings subject to change without notice.

8105

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

who would like to learn how to program. (Model III owners will receive a copy at no charge, since this is the equivalent of the *Level II Reference Manual* supplied with Model I Level II machines.)

TRS-80 Software Sourcebook, Volume 3

By the time you read this column, the third printing of our sourcebook should be ready. It looks like it will top 2,000 listings with this issue! Amazingly, we have received almost no complaints from folks who have ordered programs from the book. As most of you know, we suggest that you contact the advertiser and draw your own conclusions as to the viability of their product, since Radio Shack can't possibly verify the useability, accuracy, or even the existence of the programs listed.

For those of you unfamiliar with the book, it lists applications programs for various TRS-80's, available from a variety of vendors. There's a brief description of the program, minimum required equipment, formats in which it's available (cassette, diskette, source listing, etc.), and cost. It also includes the vendor's name and address for ordering.

Pocket Computer Sale

Although I know you may receive this magazine a few days before the end of April, I'm going to tell you anyway, because it's exciting news! During the month of May, our fantastic TRS-80 Pocket Computer will be on sale for $199! That's a savings of $50 off the regular price. You can't buy one for the sale price until May 1, so don't bother trying. But come May 1, if you've been putting off getting your Pocket Computer, there won't ever be a better time! There'll be a lot of pre-recorded software available for a number of applications, and of course you can get the optional cassette interface (not on sale) to load our packages, or your own.

I can't tell you how much nicer it is to have a BASIC programmable computer in your pocket or briefcase, than a calculator. Don't miss this chance, because after the end of May the price may never be this low again. I'm telling you about the sale here, since *80 Microcomputing* doesn't carry Radio Shack advertising. Wayne feels it might somehow compromise editorial credibility. Although we'd like to spend a little money with him, we respect his feelings.

Daisy Wheel II Deliveries

Here's a bit of forecasting I sincerely hope proves to be wrong. However, presently every indication says that our projections of demands for the Daisy Wheel II printer was grossly under the mark. We've done everything possible to speed up deliveries, but don't see the situation improving before late summer or fall. We're even trying to fly as many in as we can, and speed up production to the greatest possible extent. We all knew a reasonably-priced daisywheel printer would be a winner. However, we were unprepared for the more than overwhelming response it has received. Thanks for your support, and bear with us. We're doing our best to catch up! We'll be watching the demand on other items too, like the new Line Printer VII.

I'd like to close out by referring those of you who didn't read my March, 1981 column which dealt with what goes into a Radio Shack product. At this writing it's too early to have heard any feedback, but I believe the things I outlined are quite significant. Those TRS-80 owners or potential owners I've talked with by phone, and discussed the subject with were quite surprised to hear what we're trying to accomplish, and a number of them have indicated that it influenced their final "which to buy" decisions.

The point is, if you own a TRS-80, we'd like you to feel pride in ownership, and know that your ideas and opinions about new products, product improvements, and how we could gear up to serve you better are very important to us. We appreciate hearing your thoughts. Again, due to the limited resources for individual replies please direct routine questions to our Computer Services Group, 900 Two Tandy Center, Fort Worth, TX 76102. Send product or service suggestions to Computer Merchandising, 700 One Tandy Center, same city & zip. Thanks, and see you again next month.■

REMARKS

Continued from page 7

was saddened, but not surprised, to read in the school paper a couple years later that this teacher had committed suicide. He was a misfit in that school, possibly in any school. But at least, through him, many of us got just a taste of what education could be.

I think that if education is to survive, we must realize that it is a kind of show biz and accept the fact that education must be interesting. It really *can* be done... even in *accounting*. And, you know, while nearly everything else that I studied in college has been long forgotten, accounting has stayed with me—I still think of it as fun.

What about kids who are *not* interested in education? Is it really *our* responsibility to force feed them school work? Perhaps we should legitimize child labor, eliminate the minimum wage requirements for children under 18, and see what happens. Oh my bleeding heart! Would kids find that the alternative to education is less pleasant than school?

It is my intention with Instant Software to pursue the development of automated learning systems. I have in mind, at present, something akin to a video cassette which is coupled to a microcomputer. The micro would be programmed to show the video program and stop every now and then to make sure the student is keeping up with the material. If the student is unable to answer questions correctly, the machine would rewind and go over the misunderstood material again. A different series of questions would follow. In this way the progress of the course would be matched to the student.

If this should prove effective, I forsee a time when we might be using video disks. A particular program might cost several million dollars to produce, but it could be used to teach hundreds of millions of people. The lesson could be translated into any language and provide relatively low-cost education even for the most remote and poorest of third world nations.

Getting back to Erasmus for a moment. The clubs came to an end when the teacher's union came into power. The union insisted that teachers be paid overtime when supervising after-school clubs. The school had no budget for this additional expense, so there went all those wonderful clubs.■

Wordstar

One of our readers, Charles R. Perelman, has written a very handy book called *Shelter From the Tax Storm.*

The interesting part of the book, other than the contents, is that it was written on a TRS-80 Model II using Wordstar and CP/M. It was printed out on a NEC Spinwriter and photo offset directly from that printout. Chuck would have used TRSDOS, but couldn't find a driver for the NEC, hence the CP/M.

Chuck, by the way, is also a ham. Funny how many computerists are. WA60GW.

If anyone is interested in the book... and almost everyone should be... it is available from Chuck for $10. His address is 9777 Wilshire Bvd #700, Beverly Hills, CA 90212. Mention me.■

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132
CALL TOLL FREE 1-800-321-3552 TO ORDER
IN OHIO, call (216) 289-7500 (COLLECT)

The perfect supplement for your NEWDOS, from IJG, Inc.

"TRS-80™ DISK AND OTHER MYSTERIES"

by Harvard C. Pennington

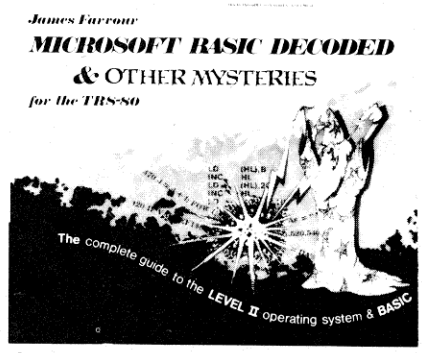
132 pages written in PLAIN ENGLISH packed with HOW TO information with details, examples and in-depth explanations. Recover lost files and directories, remove file protection, make BASIC programs unlistable. How to use SUPERZAP, recover from DOS errors and MORE!

TRS-80™ DISK $19.95

"OTHER MYSTERIES" VOLUME II

foreword by

H.C. PENNINGTON



Call now and place your order for this new book, "MICROSOFT™ BASIC DECODED & OTHER MYSTERIES for the TRS-80™", from IJG, Inc. A primer for cassette and disk BASIC on the TRS-80™, the information provided applies to similar MICROSOFT™ BASIC interpreters. Features include definition of terms, an overview of BASIC and DOS, explanation of exits, error codes, verb actions, "cold" and "warm" restart procedures and examination of system utilities, arithmetic support and I/O driver routines, and the communications region in RAM. Individual routines are explained in detail, with an index provided for easy access. Appendixes include tables for BASIC and DOS vectors, stacks and interrupt locations, PLUS thousands of comment lines for the complete MICROSOFT™ BASIC.

MICROSOFT™ BASIC DECODED .. $29.95

Let your TRS-80™ Teach You

ASSEMBLY LANGUAGE

REMSOFT's unique package, "INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING" includes ten 45-minute lessons on audio cassettes, a display program for each lesson providing illustration & reinforcement, and a text book on TRS-80® Assembly Language Programming. Includes useful routines to access keyboard, video, printer and ROM. Requires 16K - Level II, Model I.

REMASSEM-1 ..... $69.95
FOR DISK SYSTEMS $74.95

Let Your TRS-80™ Teach You

ASSEMBLY LANGUAGE DISK I/O TECHNIQUES

REMSOFT does it again! REMDISK-1 is a concise, capsulated supplement to REMASSEM-1. Package consists of two 45-minute lessons on audio cassettes, and display programs providing illustration and reinforcement. Provides specific track and sector I/O techniques, and sequential and random file access methods and routines.

REMDISK-1 ..... $29.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" PLAIN JANE™ *Gold* $25.95
5¼" DATALIFE™ MD 525-01 .. $26.95
8" DATALIFE™ FD34-8000 .... $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS + to
NEWDOS/80 UPGRADE ..... CALL
NEWDOS + with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES .. $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER .... $ 7.95

1001 THINGS TO DO WITH YOUR PERSONAL COMPUTER

BY MARK SAWUSCH

333 pages
$7.95

333 pages, written in simple terms, of "what-to-do" and "how-to-do-it". Suitable not only for microcomputers, but for programmable calculators as well. Includes program listings, formulas, a glossary of computer terms and more! Definitely a MUST BUY!

A PARTIAL LIST OF APPLICATIONS

Electric Memorandum
Energy Efficiency Computation
Test Your Typing Speed
Statistical Analysis
Options Analysis
Logic Circuit Analysis
Antenna Design
Carpenter and Mechanic's Helper
Income Tax
Speed Reading
Check Digit Generator
Personality Test
Morse Code
Finances and Investments
Biorythm
Letter Writing
Calculation of the Number of Days Between Two Dates
Simultaneous Equation Solver
Real Estate Evaluation
Astrology
General Purpose Clock/Timer
Recipe Index/Calculator
RPN Calculator

MORE PRODUCTS ⟷

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC. ©1981 by Metatechnologies Corporation, Inc.

✓20

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT May 1, 1981 THRU May 31, 1981,

Prices, Specifications, and Offerings subject to change without notice.

8105

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

80 INPUT

"I can understand such a problem—hey—it happens to everybody. . . . What I want to know is this: How contagious is this, and how long does it last?"

Fantastic Formatter

The LPRINT Formatter II program by Charles Z. Tzinberg in the February issue of *80 Microcomputing* is fantastic!

I use a Centronics 779 printer and in order to get a listing of a program, I must use the smallest print available so as not to lose any of the longer lines. This makes it extremely difficult to read. Tzinberg's program allows the use of the largest print size and makes debugging a program a breeze.

I have one suggestion to improve the program. Currently, when the listing is finished, printing will cease in the middle of the page. By changing the following lines, the printer will advance to the top of the next page (after inserting the string of dashes, if you used that option) so that your last page will be uniform in size to the others. The changes in the following lines are underlined:

```
7  X + E: GOSUB2: S = PEEK(X): X = E + 1: GOSUB2:
   S = S + PK*PEEK(X) :X = E + 2: GOSUB2: L = PEEK
   (X): X = E + 3: GOSUB2: L = L + PK*PEEK(X): IFL>
   HI or S = 0 THEN GOTO15: ELSE IF L<LO etc.
15 LPRINTSTRING$(59—LN,138): LPRINTSTRING$
   (ML," – "): LPRINTSTRING$(4,138): E = S: PG = PG
   + 1: IFL>HI THEN END ELSE GOTO 6
```

Patricia M. Finkenbine
Albuquerque, NM 87111

The Thirteenth Place

13.3.1981: After considering all the circumstances from a slightly unbiased view, I can only conclude that your March issue should have never gotten near my Model I.

Everything was fine before it showed up: The drives, printer, interface and rest of the gang were merrily churning along at a consistent ten hours a day pace. No parity panics, no boot blowouts, no directory divebombs.

Then the March issue came. Since I'm seriously considering buying a Model II (thus will be trusting those folks in Texas with my hard earned bucks and future), the article about John Roach grabbed me by the granules. After all, if I'm giving him over four grand, I'd at least like to know if he's a good guy or if he'll scurry off to Tahiti with my money.

I turned to the contents page. Sure enough, there was a teaser about Roach, the new computer chip king, and another piece on Kornfeld, the outgoing DOS scepter holder. But there wasn't a page number. No problem I figured—scan the right hand page, the one with the DIR (I,A,S) type readout.

No luck. Okay, next step. Scan the right page again, this time looking for a filespec with Nancy Robertson's byline. That panned out for a story, but not the one I was looking for.

Using the standard humanoid system (Version 1.0 as best I can tell) I "superzapped" the magazine page (byte) by page. Snuggled in on page 82 I found it.

Having worked for monthly magazines for seven years, I can understand such a problem—hey—it happens to everybody. But at about the same time I was on safari for the article my TRS-80 started rolling over. Disk drive problems: Directory Read Errors, Bad Parity Errors, Motor Speed Too Slow, Motor Speed Too Fast, Dummy At Controls, etc. If it's in the Owner's Manual under disk errors, I got it on my screen.

What I want to know is this: How contagious is this, and how long does it last?

Brad Zimmerman
Fountain Valley, CA

Any computer person will have no trouble spotting the date of this letter. I also take it as read that you've broken a couple of mirrors lately. Sprinkle a pinch of salt over the back of the keyboard and all should be OK.—Eds.

An Unsympathetic Ear

H. C. Pennington's response in the March 1981 *80 Microcomputing* to an unfavorable review of his book, *TRS-80 Disk & Other Mysteries,* heaps scorn on the reviewer. Pennington seems convinced that the ability to hurl insults is a sign of superior intelligence.

When the invective is stripped away, Pennington's defense of his book is lame. The fact remains that *TRS-80 Disk* is of little value without the purchase of a particular kind of software, for which it is an extended advertisement. Neither this fact nor any indication that the book will be of interest only to a very limited audience is apparent in the promotion of the book. The book, like the article, illustrates Pennington's talent for abuse, with Radio Shack as the object instead of John Grass.

Four pages of my favorite computer magazine were wasted on this display of bad temper.

Malcolm Nygren
Champaign, IL

Pocket Computer Tips

Here are a few tips which I have discovered for use with the Radio Shack Pocket Computer:

While in the PRO mode, instead of typing LIST (or L.), just hit the ↓ key or the ↑ key. Holding the ↓ key down will LIST the program starting from the lowest line number and working up, while hitting the ↑ key will start from the highest line number and work down.

If a different "E" is needed for some reason, use the Exp (exponential) "E".

Finally, while using the DEF, RUN, or RESERVE mode to do a series of calculations, and you hit enter but want to check the figures you used, hit either the < key or the > key to review the numbers. Otherwise, you can edit them and just hit enter to get the new result.

Bradley Smith
Yarbo, Saskatchewan SOA 4VO

In Praise of Percom Data

When a customer gets a good response from a manufacturer, the news should be heard by someone. This was the case with me when I purchased a Percom TFD-100 Disk Drive.

I was plagued by chronic inability to make successful backup copies of my TRSDOS using TFD-100 and TRS-80 Model I, Level II. I was able to do anything with OS-80 but not with TRSDOS. I wrote to Mr. Jim Stuttsman at Percom Data Co. in July

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132
CALL TOLL FREE 1-800-321-3552 TO ORDER
IN OHIO, call (216) 289-7500 (COLLECT)

MTC AIDS-III™

MODEL I . . .$69.95 MODEL II . . .$99.95

Introducing the latest addition to MTC's family of data management systems, AIDS-III. NO PROGRAMMING, easy to use. COMPLETE PACKAGE including demonstration application, documentation and MAPS-III (see below).

- Up to 20 USER-DEFINED FIELDS of either numeric- or character-type.
- CHARACTER-type fields may be any length (total: up to 254 characters).
- NUMERIC-type fields feature automatic formatting, rounding, decimal alignment and validation.
- Full feature EDITING when adding or changing records:
  - ENTER FIELD (can't type-in more characters than specified).
  - BACKSPACE (delete last character typed).
  - DELETE FIELD contents.
  - RESTORE FIELD contents.
  - RIGHT-JUSTIFY FIELD contents.
  - SKIP FIELD (to next or previous field).
  - SKIP RECORD (to next or previous record).
- SORTING of records is MACHINE CODE assisted.
  - 200 RECORDS (40 characters) in about 5 SECONDS.
  - ANY COMBINATION of fields (including numerics) with each field in ascending or descending order.
- SELECTION of records for Loading, Updating, Deleting, Printing and Saving is MACHINE CODE assisted.
  - Specify up to 4 CRITERIA, each using one of 6 RELATIONAL COMPARISONS.
  - LOAD or SAVE selected records using MULTIPLE FILES.
  - Example: Select records representing those people who live in the state of Colorado, but not in the city of Denver, whose last names begin with "F" and whose incomes exceed $9000.00.
  - Example: Select records representing those sales made to XYZ COMPANY that exceed $25.00, between the dates 03/15 and 04/10.

MAPS-III (MTC AIDS PRINT SUBSYSTEM), included at no charge, has the following features:

- Full AIDS-III SELECTION capabilities.
- Prints user-specified fields DOWN THE PAGE.
- Prints user-specified fields in titled, columnar REPORT FORMAT, automatically generating column headings, paging and (optionally) indentation.
- Can create a single report from MULTIPLE FILES.
- Prints user-defined formats for CUSTOM LABELS, custom forms, etc.

BELOW ARE TESTIMONIALS from owners of AIDS systems. These are absolutely authentic statements and are typical of the comments we receive.

"This program will do more for my business than all the other programs I have, combined."
David Wareham, Vice President (EDP), National Hospital and Health Care Services Inc.

"We have 32 different Data Base Management packages for the TRS-80. AIDS-III is easily the best. It also makes it easier for us to step up to our Model II since the package is available for both computers."
Jack Bilinski, President, 80 Microcomputer Services

"Your AIDS program is far and away the finest information management system that I've ever seen. I am currently using it to maintain a clear picture of the demographic data on all the kids in our residential treatment program and it is working for me superbly."
Frank Boehm, Director, Front Door Residential Treatment Program

MTC AIDS CALCULATION SUBSYSTEM-III™

MODEL I . . .$24.95

MTC's most popular AIDS subsystem. Use for report generation involving basic manipulation of numeric data. Features are:

- User-specified page title
- Columnar Headings
- Optional Indentation
- Use for accounting, inventory, financial and other numeric-based information systems.

MODEL II . . .$39.95

- Columnar subtotals generated when there is a change in a user-specified column.
- User-specified Columnar Totals
- Columnar values computed using constants and/or column values
- Balance forward calculations (Ex: Gross sales equals previous gross sales + sale amount + sales tax).

Compare AIDS-III™/CALCS-III™ with any other data management package under $100!

CALCS-III™ REQUIRES THE PURCHASE OF AIDS-III™

AIDS OWNERS! WE HAVE WHAT YOU'VE BEEN WAITING IV. . .

MTC CALCS-IV™, that is.

- More Computations
- Save Report Formats on Disk
- Faster, and more!

CALL FOR DETAILS and CALCS-III UPGRADE PRICING

MTC AIDS MERGE-III™

This subsystem will combine up to 14 AIDS-created data files into a single, large file. An optional purge capability removes duplicate entries while performing the merge operation (can even be used to eliminate duplicates in a single file). Machine-code assisted for high-speed performance, MERGE-III™ properly handles files sorted by any combination of fields, including numerics, with each field in ascending or descending order.

MTC AIDS MERGE-III™ $19.95
For Model II $29.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" PLAIN JANE™ *Gold* $25.95
5¼" DATALIFE™ MD 525-01 . . $26.95
8" DATALIFE™ FD34-8000 . . . . $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS + to
NEWDOS/80 UPGRADE . . . . . CALL
NEWDOS + with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES . . $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER . . . . $ 7.95

MORE PRODUCTS

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
©1981 by Metatechnologies Corporation, Inc.

✓20

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT May 1, 1981 THRU May 31, 1981,

Prices, Specifications, and Offerings subject to change without notice.

8105

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

1980. We exchanged several letters and worked hard.

On September 25, Jim found that the TRS-80 disk controller circuits activate the disk drive for 2.5 seconds. But in my unit, it may have been less than two seconds, which caused a premature "TIME OUT". So he made a special patch to enable a successful TRSDOS backup utility. It really worked! Not only was he observant and creative, but he was very patient with my request.

Shortly after the disk problem was solved, I purchased a Doubler from Percom. It was easily installed as was its data separater. The performance of the Doubler is superb. I am now enjoying both DBLDOS and OS/80D.

Thank you Jim Stuttsman and Percom Data Co.

Paul S. Satoh, PhD.
Portage, MI

RS-232 Interface

Recently there was an article in another publication discussing Electronic Systems' RS-232 interface. I am using their kit version and the bottom line is that it works.

However, other readers might be saved some grief by sharing my experience. In short, if you want to use it either exclusively for output or to input with BASIC at no more than 300 baud, you will probably be satisfied.

Unfortunately, it is not obvious how to use this device with assembler programs because the board expects the input port address on the high order address lines—not on the low order lines where the Z-80 puts it. In spite of this design error, the board works with BASIC because of a fluke, for BASIC happens to leave the value coded as the input port in the A register which the Z-80 latches on the high order address lines as part of executing this input instruction, but it isn't really a port address! In other words, the actual port address specified in the input instruction is essentially ignored.

While the board happens to work with BASIC, there is potential for disaster in assembler if both the port address and the input register were to address different hardware devices. The solution is quite simple: Pull IC U6 and bend pin 2 (not pin 1 as the schematic indicates) up at a 90° angle to the other pins so that it will not go back into the socket. Solder a jumper from pin 2 up over the top of the IC to pin 13; reinsert U6. This breaks the connection from U8 pin 8 to U6 pin 2 and connects instead U4 pin 8 to U6 pin 2 which changes the input port address from the high order to the low order address lines, from 55 (37H) to 248 (0F8H). The address from which status is loaded and into which output data are loaded remains 37F8H. Thus in BASIC the only change is to use INP(248) instead of INP(55).

If you are concerned about possibly destroying something, note that this does nothing to the printed circuit board. Also, the IC costs 29¢ at Hobbyworld. And should you ever need to, that same 29¢ IC would let you return to the original functioning of the board.

All of the above of course assumes no change in design—so check your board (not just the schematic). To spare you a long sad tale of woe, suffice it to say that, once you get it to work, it's a nice device with DIP switch selectable baud rate, parity, word length, and stop bits, but Heathkit it ain't.

Edgar C. Howell
Simi, CA

Tax/Saver Review

We thank Michael Tannenbaum and Gordon E. Lamb for reviewing Tax/Saver in the February issue of *80 Microcomputing*. We are gratified by the favorable reviews Tax/Saver has received.

We would like to comment on some valid points raised by the article.

Several features not included in the demo which was reviewed are built into the marketed version. An example is an option which allows the user to stop the session at numerous controlled points, turn the computer off, and resume processing from that state at a later time.

Tax/Saver covers many schedules and forms in depth and detail. It accepts totals from all other schedules and forms.

We would like to point out that Tax/Saver is more than a program; it's a service. Subscribers also receive our Tax Facts newsletter and are entitled to a discount on the yearly update.

Netta K. Stern
Micromatic Programming Co.
Georgetown, CT 06829

New Patches

Several months ago you published a letter from us describing a set of patches to Model II TRSDOS version 1.2 which moved the break key function out of the operator's way so it would not be pressed accidentally while reaching for the back-space key. Now that TRSDOS 2.0 (and 2.0a) are almost universally in place, I thought your readers would appreciate the equivalent patches for the newer releases:

```
PATCH SYSRES/SYS A=0407,F=03,C=FE
PATCH BASIC A=57E7,F=03,C=7E
PATCH BASIC A=594C,F=03,C=7E
PATCH BASIC A=5F70,F=03,C=7E
PATCH BASIC A=6606,F=03,C=7E
PATCH BASIC A=6515,F=03,C=7E.
```

Be sure to reset the system after applying the patches to make them fully effective.

One word of caution: SCRIPSIT uses <ctrl>6 as a function key, therefore you *must not* apply these patches to a SCRIPSIT disk.

Robert F. Snapp, President
Snapp, Inc.
Cincinnati, OH

CROSSREF Mod III

CROSSREF, (*80 Microcomputing*, January 1981), will work fine on a TRS-80 Model III if you make two changes to Part A, as follows:

In line 65502, change 17128 to 17384
In line 65504, change 17127 to 17383

Part B needs no modification.

To append Part A to your program on a Model III, one small but vital change must be made to the procedure described in Table 1. The last operation in Step 4 should be changed from POKE16549,66 to POKE16549,67.

These differences between Model I and Model III result because Radio Shack advanced the starting address of BASIC programs by 256 bytes. Unfortunately, the Model III manual incorrectly shows this address as being the same as for Model I.

Donald N. Ewart
Scotia, NY

Review Umbrage

Eds. Note: The following is from a letter sent to Dennis Thurlow, author of the review in question.

As a partner in Rational Software and the author of the program "Programmer" which you reviewed in the January, 1981 issue of *80 Microcomputing*, I would like to comment on your review.

The next-to-last paragraph contains a statement ("Once memory has been protected for a program... no more overhead should be necessary for its operation.") which is at best a personal prejudice of your own, and at worst, simply untrue. You would not expect a text editor or an interpreter to function without using external memory; why then demand that

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132

CALL TOLL FREE 1-800-321-3552 TO ORDER

IN OHIO, call (216) 289-7500 (COLLECT)

MTC AIDS CALCULATION SUBSYSTEM-III™

MODEL I . . .$24.95 MODEL II . . .$39.95

User-specified page title

Automatic Page Numbering

Columnar Headings

User-specified initial balance forward

Optional Indentation

Columnar values computed using constants and/or column values

Columnar subtotals generated when there is a change in a user-specified column.

Balance forward calculations (Ex: Gross sales equals previous gross sales + sale amount + sales tax)

User-specified Columnar Totals

CUSTOMER ACTIVITY REPORT PAGE 1

CUSTOMER	DATE	QTY	SALE AMT	SALES TAX	GROSS SALES	$/UNIT
					0.00	
ACME	3/10	100	675.00	37.13	712.13	7.12
		200	1325.00	72.88	2110.00	6.99
	3/20	400	2475.00	136.13	4721.13	6.53
	4/10	600	3625.00	199.38	8545.50	6.37
	4/20	400	2600.00	143.00	11288.50	6.86
		1700	10700.00	588.50		
META	3/10	200	1345.00	73.98	12707.48	7.09
	3/15	100	674.00	37.07	13418.55	7.11
		200	1295.00	71.23	14784.77	6.83
	4/05	400	2435.00	133.93	17353.70	6.42
	4/10	150	935.00	51.43	18340.12	6.58
	4/20	600	3585.00	197.18	22122.30	6.30
		1650	10269.00	564.80		
OURCO	3/25	200	1325.00	72.88	23520.17	6.99
	4/10	100	685.00	37.68	24242.85	7.23
		300	1940.00	106.70	26289.55	6.82
		600	3950.00	217.25		
XYZCO	3/10	150	995.00	54.73	27339.27	7.00
		200	1345.00	73.98	28758.25	7.09
	3/20	50	355.00	19.53	29132.77	7.49
	4/10	300	1975.00	108.63	31216.40	6.95
	4/15	400	2520.00	138.60	33874.00	6.65
	4/20	700	4175.00	229.63	38279.62	6.29
		1800	11365.00	625.08		
		5750	36284.00	1995.62		

Compare AIDS-III™/CALCS-III™ with any other data management package under $100!

Others make claims, CALCS-III™ delivers with user-specified:

- Fields in any order, with optional indentation
- Computations using field values and constants
- Columnar subtotals and totals
- Full AIDS-III selection of records to be printed

Use for accounting, inventory, financial and other numeric-based information packages.

CALCS-III™ REQUIRES THE PURCHASE OF AIDS-III™

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC. ©1981 by Metatechnologies Corporation, Inc.

20

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT May 1, 1981 THRU May 31, 1981,

Prices, Specifications, and Offerings subject to change without notice.

8105

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

other utilities be self-contained? Further, by making that statement without providing any information as to when or why Programmer uses external memory, the entire purpose of the paragraph is lost to the reader. I find this especially irritating as I took some pains to make clear in the instructions when, why, and how external memory is used.

Finally, I'd like to say that the two bugs you reported have been removed from the program, and though it still uses external memory (and always will), our users are (as you said) finding it extremely useful.

Tom Little
Rational Software
Pasadena, CA 91106

Microsoft Computer

I purchased my TRS-80 16K system in June 1980. I had a pressing need to manipulate strings but no computer background. It quickly became apparent that due to the 15,000 characters per file I sought to manipulate in memory, plus my inability to produce efficient code, I must upgrade to a 48K double drive disk system.

After an ineffably frustrating sixty days (and nights) and a weight loss of 25 lbs. (which I won't miss)—my program accomplished the file manipulations intended.

Then reality set in. The program was slow. So slow, in fact, that completion of all the assigned manipulations averaged just under five seconds per string. After boggling my way through several texts and borrowing more techniques from periodicals, I managed to reduce the average time to 2.7 seconds; still unpleasantly slow considering that one program cycle involved six or seven files of 600 to 700 strings per file.

Then the Microsoft compiler arrived. After the initial study period with the manual I put my program titled CMBSCORE/BAS (residing on a TRSDOS disk stripped of utilities and BASIC) in drive 0. The two disks that comprise the compiler program were installed in the other two drives. The rest was simple, even for me. I typed CMBSCORE= CMBSCORE (ENTER) and waited for the whirring and an occasional 'clunk' to stop (the clunk from an older style drive my friendly Tandy computer specialist passed off on me).

Next, my display read "(0000) FATAL ERRORS." Scared the socks off me. Rereading the manual convinced me that the (0000) was the important part of the message and the FATAL ERRORS was there, at least this time, just to keep my blood pressure up.

The next step was also easy. Type CMBSCORE, CMBSCORE-N-E (ENTER). Several minutes later the compiled program was ready. I typed CMBSCORE (ENTER) and the program loaded and was displayed. I specified the files to be manipulated and watched the strings fly by. The processing time was now .16 seconds per string instead of the previous 2.7 seconds.

I now process files containing up to 5500 characters each plus 700 or more five-digit integers at an entirely safisfactory speed. Incidently, several games move so fast that I am destroyed, eaten, mauled or gassed by trolls, goblins and satellites before I can press a finger in my own defense. Graphics flash rather than sputter. Another big, big bonus: TRS-80 no longer withdraws into that familiar catatonic state to adjust its brains. This is no great news to all of you experienced assembly programmers, but for beginners this is an exciting feature.

I am "Bardenizing" myself, so in due time I may master some assembly language. In the meantime, that Microsoft compiler will be my close companion. It may, with my blessing, take all the room in memory it wishes. The least I can do for all the service it renders is to live with what I consider to be more than adequate remaining memory and disk space.

David W. Jessup
Seattle, WA

More Mail File System

M. Barlow's letter in the February *80 Microcomputing,* stunned me. I thought I might pass along my experience with Galactic Software's "Mail File System."

I am involved in a business that involves taking long orders from over 300 customers, updating deliveries and mailing weekly solicitations to the same. No data base program is going to run as fast as I can manually do the filing and updating—not to mention the enormous amount of memory I would need. But with clever coding (if you don't mind me saying so, myself), I have turned the "Mail File System" into a timesaving way to print labels, and an outstanding data base program.

The zip code listing gives me an idea of which accounts are geographically near others, helping me plan sales trips. By coding accounts, I can systematically break down when an account last bought a particular category of items from me. It takes about two hours manually to do this; 10 minutes, total, on "Mail File System".

But, you're saying, any mailing list system can do that. I don't care. All I know is that this system works for me. My office help, with no computer experience, can run it without me being there.

When I had a question, I called Galactic Software, and they gave me a useful answer. When I thanked them for the answer, they said, "That's what we're here for." Boy, that's great to hear!

Yeah, the program isn't perfect. There is a bug in the printing test labels, but it is easily corrected. And I wish I could do form letters and have the program insert names. Maybe, someday, it will (hint). As I said, nothing is perfect, but I am willing to accept a product that "works first time, every time", and this program does.

Neal Elkind
1004 The Apparel Center
Chicago, IL 60654

Paper Tiger

The article entitled "Paper Tiger Screenprinter" by Ruth Lewart in your February 1981 issue was excellent. Her explanation about creating a software alphabet enabled me to construct data statements for the lowercase letters, which were not incorporated in her data.

Below are the data statements for lowercase and some special characters, along with the appropriate program statement changes:

```
10850 DATA 72,126,73,66,32, 32,84,84,84,124, 127,40,68,
68,56,56,68,68,68,40   'lb. symbol, a, b, c
10860 DATA 56,68,68,40,127, 120,84,84,84,24, 0,8,126,9,2,
8,84,84,84,56   ' d, e, f, g
10870 DATA 127,8,4,120,0, 0,68,125,64,0, 0,32,64,64,61,
127,16,40,68,0   ' h, i, j, k
10880 DATA 0,65,127,64,0, 124,4,120,4,120, 124,8,4,4,120,
56,68,68,68,56   'l, m, n, o
10890 DATA 124,8,20,20,8, 8,20,20,8,124, 124,8,4,4,8,
72,84,84,84,36   ' p, q, r, s
10900 DATA 0,4,63,68,32, 60,64,64,32,124, 28,32,64,32,28,
60,64,48,64,60   't, u, v, w
10910 DATA 68,40,16,40,68, 12,80,80,80,124, 68,100,84,76,
68,8,54,65,0,0   'x, y, z, (
10920 DATA 0,0,119,0,0, 0,0,65,54,8, 41,42,124,42,41,
85,42,85,42,85   ' vertical line with space in center, }, undefined character, undefined character
10540 DIM QG$(7,3),QA$(96,3),QM(42),QN(64)   'GRAPHIC, ALPHANUMERIC STRINGS AND TABLE ENTRIES
10580 FOR QI=0 TO 95: FOR QJ=0 TO 4 ' CREATE ALPHA STRINGS
```

Note: Remember to clear extra string space in the driver program. CLEAR 3000 should be sufficient.

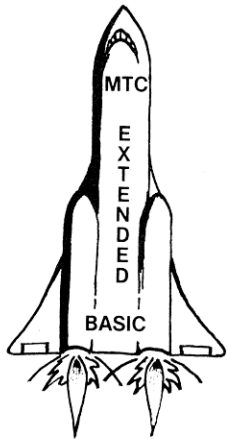
There appears to be an idiosyncrasy in my TRS-80. When running the Screenprinter with a game program, the first several alphanumeric characters PEEKed

Continue to page 20

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132
CALL TOLL FREE 1-800-321-3552 TO ORDER
IN OHIO, call (216) 289-7500 (COLLECT)

TAKE YOUR MODEL II TO NEW HEIGHTS



MTC is proud to announce MTC EXTENDED BASIC for the Model II, by R. Ryen. Features include "fixes" to existing BASIC, multi-line functions, extending an existing sequential file, PEEK, POKE, greatly enhanced screen control and expanded editing capabilities. The contents of variables are NOT CHANGED when editing, deleting, inserting or merging lines, allowing continued program execution! All this and much more.

MTC EXTENDED BASIC ..... $ 99.95

80 – 20 = 129.95

THE ORIGINAL NEWDOS/80
WITH MTC QUE CARD

★ **SPECIAL PRICE** ★

SAVE $20 **$129.95**

Apparat's long-awaited successor to NEWDOS+ is here! This is not an enhanced version of NEWDOS, but a completely new product. Simplified DOS commands can be instantly executed from BASIC, even within a program, without disturbing the resident code. System options, such as password protection, number and type of disk drives, BREAK key enable/disable and lowercase modification recognition, can be quickly and easily changed. Five new random-access file types allow record lengths of up to 4096 bytes, and no FIELDing! A powerful CHAIN facility allows keyboard INPUTs to be read from a disk file. An improved RENUMBER facility permits groups of statements to be relocated within program code. Diskettes may even be designated as RUN-ONLY! Features all NEWDOS+ utilities (SUPERZAP 3.0, etc.) and much more! One MTC technical staff member said having NEWDOS/80 is "better than sex" (you'll have to judge for yourself!). Includes 180-page instruction manual and MTC QUE card.

NEWDOS/80 # SPECIAL # $129.95
MTC QUE Card only ..... $ 7.50
CALL REGARDING OUR NEWDOS+ UPGRADE PRICING

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" PLAIN JANE™ *Gold* $25.95
5¼" DATALIFE™ MD 525-01 .. $26.95
8" DATALIFE™ FD34-8000 .... $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS+ to
NEWDOS/80 UPGRADE ..... CALL
NEWDOS+ with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES .. $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER .... $ 7.95

Let Your TRS-80™ Test Itself With

THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

by THE MICRO CLINIC

A complete checkup for your Model I. THE FLOPPY DOCTOR completely checks every sector of 35- or 40-track disk drives. Tests motor speed, head positioning, controller functions, status bits and provides complete error logging. THE MEMORY DIAGNOSTIC checks for proper write/read, refresh, executability and exclusivity of all address locations. Includes both diagnostics and complete instruction manual.

SYSTEM DIAGNOSTICS $19.95

An improved version of the SYSTEM DIAGNOSTICS above. Designed for single or double density, 35-, 40-, 77-, or 80-track disk drives. Includes new and modified tests. Features THE FLOPPY DOCTOR, Version 3.0.

SYSTEM DIAGNOSTICS-V3 .. $24.95

Complete for Model I with all utilities
Plus exclusive MTC QUE card!

NEWDOS+ $69.95 by Apparat

Includes REF, RENUM, SUPERZAP, EDITOR/ASSEM., DISASSEM., DIRCHECK, and more! This is the original NEWDOS with all of Apparat's utility programs. Includes exclusive MTC QUE (Quick User Education) card.

40-Track Version $79.95
MTC QUE Card only ..... $ 1.50

← **MORE PRODUCTS**

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
©1981 by Metatechnologies Corporation, Inc.

✓20

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT May 1, 1981 THRU May 31, 1981,
Prices, Specifications, and Offerings subject to change without notice.

8105

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

Yes, You Can Increase Your Programming Productivity

SNAPP II EXTENDED BASIC

SNAPP II EXTENDED BASIC A family of enhancements to the Model II BASIC interpreter. Part of the package originated with the best of APPARAT, INC.'s thoughts in implementing NEWDOS BASIC. The system is written entirely in machine language for SUPER FAST execution. The extensions are fully integrated into Model II BASIC, and require NO user Memory, and NO user disk space. The package is made up of the following six modules.

XBASIC—Six single key stroke commands to list the first, last, previous, next or current program line, or to edit the current line. Includes quick way to recover BASIC program following a NEW or system or accidental re-boot. Ten single character abbreviations for frequently used commands: AUTO, CLS, DELETE, EDIT, KILL, LIST, MERGE, NEW, LLIST, and SYSTEM.

XREF—A powerful cross-reference facility with output to display and/or printer. Trace a variable through the code. Determine easily if a variable is in use.

XDUMP—Permits the programmer to display and/or print the value of any or all program variables. Identifies the variable type for all variables. Each element of any array is listed separately.

XRENUM—An enhanced program line renumbering facility which allows specification of an upper limit of the block of lines to be renumbered, supports relocation of renumbered blocks of code, and supports duplication of blocks of code.

XFIND—A cross reference facility for key words and character strings, also includes global replacement of keywords.

XCOMPRESS—Compress your BASIC programs to an absolute minimum. Removes extraneous information; merge lines; even deletes statements which could not be executed. Typically saves 30-40% space even for programs without our REM statements! Also results in 7-10% improvement in execution speed.

ENTIRE PACKAGE FOR MODEL II $200
ENTIRE PACKAGE FOR MODEL III $125

DOUBLETAKE 3741

This is not a football play but the way to play ball fast in converting IBM 3741 and similar formated diskettes to Radio Shack formated disks or vice versa. Fast is the name of the game. $200

SNAPP SCREEN

Another dependable product from Snapp, Inc. Using rigid plastic, Snapp, Inc. designed the ultimate green screen at the lowest price. The Snapp Screen installs in a Snapp with the use of pressure sensitive tape. Reduce user fatigue with the Snapp Screen. $10

2.00 shipping and handling—waived with the purchase of any software.

SUPERSNAPP X

You can sort fast using your present facilities, or you can do it faster with Racets' superb facilities, or you can use the fastest: SUPERSNAPP X. The heart of SUPERSNAPP X is a SUPER FAST in-memory sort routine that has been benchmarked against everything on the market and beats them all . . . hands down.

SUPERSNAPP X is the most important component of SNAPP X EXTENDED BUILTIN FUNCTIONS which is a much needed set of additions to the Model II BASIC interpreter that will put time saving power at your fingertips. Let's compare (using random data) SUPERSNAPP X and Racet's GSF SORT for speed:

SORT	SUPERSNAPP X	RACET GSF
10,000 integers	39 seconds	59 seconds
5,000 Singles	22 seconds	34 seconds
2,000 Strings	10 seconds	15 seconds

SUPERSNAPP X is guaranteed to be the FASTEST in memory SORT on the market or your money back. With it you also get these EXTENDED BUILTIN FUNCTIONS: PEEK, PEEKW, POKE, POKEW, XDAT$, XTIM$, ETIM$, FILES, AND THE SPECIAL SCMD (SNAPP___COMMAND). PLUS: open "E" Set SCROLL PROTECTION. ERASE all ARRAYS in one command. Specify size and Blink rate of CURSOR. Long ERROR messages. Read from Video Screen Read. PEEK complete strings from memory. POKE complete strings to memory. convert upper case to lower case and vice-versa, turn complete screen off and on at will, extract largest or smallest values from user supplied list of numbers and probably the most powerful addition ever made to MICROSOFT BASIC print using into a string. Use your imagination with this function, it will perform wonders. $100.00

SPOOLER Model I, Model II and Model III

Our workhorse! Unlike the one supplied with TRSDOS 2.0, ours requires no special knowledge or training on the part of the operator. Additionally, ours performs much better. On the Tandy SPOOLER, every time a disk is accessed, the printer stops dead! This package is available for Model I, in the TRSDOS/NEWDOS 80 versions, or for the Model II or Model III. Greatly enhances system performance when running typical business applications. Many applications have been benchmarked to run nearly TWICE AS FAST with the SPOOLER installed. Installs in minutes and no changes are required to your programs. The Model II version requires NO user memory. If purchasing more than one system, call for price quote. $100

AUTOFILE

Another big time saver from Snapp, Inc. Autofile offers all programmers much needed time saving tools to use when working with direct files. Eliminate tedious commands such as LSET's, MKI$'s, MKD$'s, MKS$'s, CVD's, CVI's and CVS's. When used in conjunction with Automap an update program can typically be reduced by as much as 90%. $50

AUTOMAP

Save time creating a formated screen with our Extended Basic Mapping Support system. The programmers task of communicating and displaying information with the user operator is completely automated with simple SEND and RECEIVE statement commands. Many different types of information can be sent and received from the operators with the use of a single command. Many hours of programming time are saved and cost efficiency is truly realized using Automap. $75

VSAM

Virtual Snapp Access Method. V.S.A.M's development was built upon several man years of research and development by Snapp, Inc. studying all previously available access methods to small computers. What evolved was the ultimate keyed data access method available for any small computer. All records in the Data Base are truly variable in length to maximize the utilization of valuable disk space on TRS 80 systems. Irrelevant blanks are never physically recorded on the diskettes leaving only necessary data actually stored. Data Bases are defined with one primary key. Retrival with this key is quick and CONSISTANT without regard to maintenance activity levels. Additional fields may be described as alternate key fields. Access time using alternate key fields will be slower than through the primary field but it also will be CONSISTENT without regard to Data Base maintenance activity levels. VSAM is fully integrated into BASIC with commands easy to learn and use. $500.00

DOTWO

Allows programmer to build a list of any commands. All languages are supported. With DOTWO a programmer is now allowed to add any new commands of any kind and not be limited to subset restrictions. Anything that can be typed into the keyboard makes an acceptable command with DOTWO files. A programmer can virtually build an unlimited series of commands and not be limited to just TRSDOS commands. Included at no charge: BUILD/BAS which gives a programmer an easier method of creating and maintaining DOTWO or DO files. $100.00

HOSTII / TERMII

Allows remote control of a Model II from another Model II, or any ASCII terminal. Our Host system, unlike the one supplied with TRSDOS 2.0, supports accurate screen positioning on the Term station. Without this feature, formated displays appear on the screen looking like randomly placed garbage. Requires NO user memory! This system is designed to provide software support to our customer locations without ever leaving the office. Custom versions are now available for most nationally distributed terminals as a $25.00 option. Call for details. $50

Preliminary Model III version now available with standard host/term features. Special May intro Price $35

PL/B

The most powerful logical components have been selected from the worlds most powerful language to give you the most unbeatable program development tool to improve your programming productivity! Snapp, Inc. has merged the most useful components of BASIC with the power of PL/1. An unbeatable structured programming facility resulted that can increase programmers productivity up to 50%. Unlike competitive products, which are slow rigid preprocessors' representing a primitive attempt to bring Structured Programming concepts to the Micro-Based user, PL/B is today's fourth generation answer to a fourth generation problem! PL/B can give you triple the power of the earlier preprocessors at triple the speed. PL/B is fully integrated into the BASIC interpreter. Two modes of operation are available. Transparent (hidden) or Compile and save mode. Increase your productivity and save time with PL/B. $200.00

BREAKOUT

With Breakout you can learn the internal workings of TRSDOS 2.0 using any standard disassembler. Find your way out of the maze and save programming time by eliminating the unneeded steps in TRSDOS 2.0. This is a must product for all advanced TRS80 programmers. $200

DOSFIX

A collection of patches to TRSDOS and BASIC to enhance their usability and function. Includes our well known BREAK7E patches and facilities to disable and verify detect which will increase average disk speed by 30%. Free with any Model II Software Package. Purchased separately. $10

3M SCOTCH DISKETTES

Double density certified 8" Floppies for the Model II. Better quality is not available at any price. Ten diskettes to a box.

3M

Quantity (boxes)	Price Per/Box
1	$34
5	$33
10	$32
20	$31

$3.00 shipping charge. This charge is waived if software is purchased on same order.

TERMS OF SALE

Shipments normally made within one day of receipt of your order. Customer normally pays shipping cost, except pre-paid orders including software, in which case shipping cost is absorbed by Snapp, Inc. C.O.D. orders will have standard C.O.D. fee added to shipping charge. Net 10 days will be granted to governmental agencies, educational institutions and well rated business firms. Please include purchase order number. Ohio residents add 5½% sales tax or exemption certificate.

OUR GUARANTEE:

If your diskette arrives damaged, we will replace it without charge. If you ever accidentally damage it, we will replace it for a $10 handling charge. For a period of one year, we will provide you with any enhancements or updates for a $10 handling charge. For a period of one year, if errors are discovered in the programs, they will be corrected without charge. In the event we cannot correct an error, you may return the program material for a refund. Electric Pencil is a trademark of Michael Schrayer Software, Inc. TRS-80 and TRSDOS are trademarks of the Radio Shack division of Tandy Corporation.
NEWDOS and NEWDOS/80 are trademarks of Apparat, Inc.
RACET GSF is a trademark of Racet Computes.

SNAPP, INC.
SNAPP, INC.
SNAPP, INC.
SNAPP, INC.
SNAPP, INC.
SNAPP, INC.

See us at the National TRS 80 Microcomputer Show May 21-22-23 in Booths 74 and 75.

Call our toll free number: 1-800-543-4628
Ohio residents call collect: (513) 891-4496

SNAPP, INC.
8160 Corporate Park Dr.
Cincinnati, Ohio 45242

have 64 subtracted from their ASCII code. Any spaces PEEKed prior to these characters have the correct code. I changed the following program statement in Screenprinter to overcome this weird occurrence.

```
10090 FOR QI=0 TO 63:QN(QI)=PEEK(QS+QI):IF
QN(QI)<32 THEN QN(QI)=QN(QI)+64:NEXT
```

Perhaps one of your readers can solve this mystery.

William D. Webb
Norristown, PA 19401

Ode to Soft Sector

The following is a copy of a letter I sent to Soft Sector Marketing regarding their word processing system, Lazy Writer. I don't know these guys or anything about them, but I do know that I am so pleased with what I got from them that I have to share it:

I recently purchased "Lazy Writer", to be used with my TRS-80 with 32K, two disk drives and a Line Printer II. I am doing Oil and Gas Leasing that requires much paper work that I have to type myself, and I have been using two of the other systems. I bought your product sight unseen, and I was not sure what I would be getting. You seemed very open and proud of what you had to offer, but I naturally put that off as just the standard sale pitch, or, worse yet, the con artist at work.

I have often bought things I was later sorry I bought because they did not perform the way they should have or the way I thought they should have performed. A few purchases proved to be winners. *But I want you to know that I consider this purchase from you the best I have ever made for performing the function it was intended to do.* If you have any callers who want to talk to a user that can't believe how lucky he was to make a sight unseen purchase, give them my number.

A.M. Phelan, Jr.
Beaumont, TX

Applied Applications

Re: "80 Applications", February, 1981: I found two errors in this otherwise fine article.

Page 42: The A4 address line is not necessary to address the range of 3000H to 37DFH. Remove the connection from A4 and use gate Z2C as an inverter between Z1 pin 8 and Z2D pin 12.

The other, on page 44, is not really a fatal error, but the wires on pins 18 & 20 should be reversed. To quote page 2-10 of the *1980 Intel Component Data Catalog,* paragraph "Output or-Tieing": "To most efficiently use these two control lines, it is recommended that $\overline{CE}$ (pin 18) be decoded and used as the primary device selecting function, while $\overline{OE}$ (pin 20) be made a common connection to all devices in the array and connected to the READ line from the system control bus."

The $\overline{CE}$ pin 18 is a power-down standby mode which when brought high, puts the output into a high impedance state and the power consumption to a fraction of what it is in the read mode.

Chuck Barnett
Hanover Park, IL 60103

Reader Barnett is correct on both points. The Radio Shack communications addresses are not completely decoded, meaning that an active A4 address line could select an undesired "phantom" communication location. In fact, to be safe, disconnect not only A4 but also A5 (from Z1 pin 6), and connect pins 6, 11 and 12 of Z1 together.

As for the 2716 pin selection, the 1978 Motorola data sheet I used for this design briefly noted the standby mode, but did not make the Intel recommendations. I agree with Mr. Barnett and Intel that pins 18 and 20 should be switched.

Dennis Bathory Kitsz
Roxbury, VT 05669

Larger Forwarding Address

I enjoyed the article by Bertram A. Thiel titled "No Forwarding Address", in your March issue. Since I use GOSUBs extensively in my programs, I found Program Listing 2 most useful. However, since my machine is a 32K disk system, I had to make some modifications to the routine to make it work for larger programs.

My program listing includes a new line 65305 for addresses above 32767. Line 65300 was changed to show Disk BASIC's program starting address. Lines 65340 and 65360 were changed to GOTO 65305.

James R. Albright
Daytona Beach, FL

PROGRAM LISTING FOR 32K DISK SYSTEM

```
65299 END
65300 P1=27206
65305 IFP1>32767THENP1=-1*(65536-P1)
65310 P2=PEEK(P1)+PEEK(P1+1)*256
65320 IFPEEK(P1+2)+PEEK(P1+3)*256=65298THEN
      65370
65330 PRINT"TO SAVE LINE NUMBER";PEEK(P1+2)+
      PEEK(P1+3)*256;"THEN ENTER A Y ELSE JUST
      PRESS ENTER";
65340 INPUTP3$:IFP3$="Y"THENP3$=""":P1=P2:
      GOTO 65305
65350 POKEP1+2,0:POKEP1+3,0
65360 P1=P2:GOTO65305
65370 DELETE 65299-65380
65380 END
```

Further Variations

"80 Input" in the February issue printed a letter from Doug Walker about the starting point for BASIC programs and variations between Level II and TRSDOS 2.3.

Both figures quoted (27172 and 26302) are correct. They are, however, mutually exclusive in that the figure depends upon the number of files asked for when BASIC is invoked. The first number is for three files and the second for zero files. For those who use NEWDOS + or NEWDOS80 the figures are again different.

Files	2.3	DOS +	DOS80
1	26592	26230	26604
2	26882	26520	26905
3	27172	26810	27206
	etc.		

My suggestion would be to use the address already stored in RAM at 16548 and 16549 with the convention POKE (address), PEEK(16548) and POKE(address), PEEK (16549). The PEEKs could be gotten in an earlier statement in the program and stored for use at the proper point.

Sim Tyler
Overland Park, KS 66212

Likes Meta Tech

I would like to tell my fellow readers about a product I purchased. Meta Technologies of Euclid, OH sells Aids3/Calcs3, and I would recommend it to anyone who needs a good data management system.

Two reasons prompt me to recommend their product. The system works exactly as they say it will and every time I run it I am amazed at the things it will do. The people at MTC will give prompt, courteous, competent answers to all questions if you run up on any problems. Since I was new to disk drives and all the problems they can cause for a beginner, I did have problems. MTC helped me with these problems and with their help I went on to have a system that has helped me a great deal in my business.

It is refreshing to find a company such as MTC that will do what they say they will do and go out of their way to help you when help is needed.

Joe L. Peacock, President
Peacock Plastics Company
Jacksonville, Texas 75766

80 AID

Sargon Players

I enjoy playing chess with Sargon II on my TRS-80 48K Model I, but many times the game lasts longer than I expect to play. I must then abort the game or write everything down and reset the chess board when I wish to play again. I thought that if I could load in RSM-2D first, play the game, then save the game to disk, when I want to renew my game all I would have to do is load the game back in under RSM-2D, 32D.

The steps which I follow are:

(a) Load in RSM-2D, 32K.
(b) Reboot, hold auto key and type in Sargon II/CMD.
(c) Play game.
(d) Hold break key and reboot.
(e) Hit enter—memory size appears.
(f) Hit enter—Radio Shack Level II BASIC.
(g) Type System. Computer responds *?.
(h) Type /44032. Computer responds Command.
(i) Type $20 5000 20. Computer Responds "Disk Error"

Help! Can someone tell me what I am doing wrong? I tried different combinations to save the program, but to no avail. How do you know how many sectors to save, and where to start? Does anyone know a better way to save a Sargon game to disk?

Anthony Rattenni
173 Westminster Dr.
Yonkers, NY 10710

Aid Reward

Since last November we have had our Model II with Scripsit and the new Daisy Wheel Printer II up and running in our office. Aside from a few bad disks, the machine has operated flawlessly and has been a tremendous help getting the work out.

There is one quirk which I hope someone out there can help us with. Although the printer has both a section sign and a paragraph sign, Scripsit won't print them. Since we constantly refer to sections and paragraphs of various statutes this is more than a little annoying. It is all the more annoying when the Scripsit manual shows how to print a British pound sign and various foreign language accents.

We will gladly trade the British pound sign for a section sign. How do we get inside the program to change the codes that drive the printer? Since we know very little about computers, we hereby offer a reward of $15 to the first person who can give us a fix for this.

Petralia, Neild & Webb
811 First Federal Plaza
Rochester, NY 14614

DVORAK Aid?

I read with interest the article by Waldo T. Boyd about the DVORAK keyboard *(80 Microcomputing*, December 1980). It's all the rage...even *Time* Magazine has mentioned it.

As Boyd mentioned, his program cannot be used with Electric Pencil or Scripsit since they do not use the keyboard routines in the ROM. Has anyone figured out how to patch the DVORAK keyboard software into Pencil or Scripsit? The keyboard is not much use if it can't be used with a word processor.

Any help would be greatly appreciated.

John T. Phillipp, MD
127 E. 45th St.
Brooklyn, NY 11203

Paragraph Problems

I see that SCRIPSIT/Selectric problems still seem to generate letters from your readers. I, too, have such an arrangment and problem. My problem is in the paragraph indents and the slopover of the first sentence of each paragraph.

I have tried for a fix to my problems. Thanks to your SCRIPSIT articles and letters from readers I was made aware of the so-called "fix" that Tandy would provide. I now have my three sheets of meaningless gibberish. My last response from Tandy was to a letter I sent them explaining my problem and furnishing examples. Their response was that they did not feel my problem originated with their equipment, but rather in the ASCII/BCD interface. At first I thought this was a typical cop-out, but the more often I hear about different problems, the more I tend to believe them.

My Selectric is a Model 2740 and I use an interface provided by Micromatic 80. I am going to pursue my problem with the interface manufacturer. If any reader happens to have anything that would contribute to solving this problem, I certainly would appreciate the help.

R. S. Walters
203 N. Patton
Arlington Hts. IL 60005

CRT Trouble

I have set out to follow what seems to be an impossible course. My CRT in my "80" is failing. I would like to replace it with a genuine green phosphorous CRT. I have called all local suppliers and they treat me as if I had the plague.

I received a tip from a repairman for Bunker/Ramo computers. He said that Clinton Mfg. makes their CRTs. However, I have not been able to find any sort of address for them.

Could you give me the name of a supplier that makes these things? Or maybe the address of Clinton Mfg.

Anthony E. Kazee
1425 No. Mojave Rd.
Las Vegas NV 89101

RST Aid Needed

I have been disassembling Level I BASIC for relocation in high RAM. I would very much like to contact anyone who could give me some information regarding the restarts (RST) within the language.

Andy Pickett
520 S. Center St.
Plainfield, IN 46168

Portable Store

Recent comments in your letters column have compelled me to grapple with a real typewriter keyboard (no numeric keypad, lowercase) and rally to your defense. The comments I refer to have to do with the amount of advertising in the pages of *80 Microcomputing.*

It seems that some of your readers do not approve of the large amount of ads. Are they nuts or do they suffer from a heart condition which makes it hard for them to turn so many pages?

I live in a small town (30,000). We have two Radio Shack stores. The downtown store personel are quite knowledgeable about computers. The guys out at the shopping center readily admit that their computing skills are limited to playing blackjack. Outside of these two stores, there is no other source within 120 miles for computer items of any significance.

The pages of *80* are my computer store. It is in these pages that I get an education as to what's happening in the software and hardware markets. If it weren't for *80*, I would be eternally stuck with a mailing list program that takes 15 hours to sort 600 names, and I'd still be paying $5.95 each for disks. Your reviews of your advertisers products serve to (hopefully) protect your readers from some of the bad buys on the market.

Keep up the good work, guys. I for one think I'm getting my money's worth.

Bill Robinson
Merced, CA 95430

Model III AutoEdit

I have been having difficulty making some of your programs for the Model I work on my Model III. One case in point was the "AutoEdit" program described in the February 1981 issue. Apparently the addressing system in the Model III is different enough to foul up the program. However, I thought your readers might be interested in my solution so that they could use this very useful program in their Model III's.

The location for the "current line pointer" (the period in EDIT.) is correct at 16620. If we increment that value by N with a POKE at 16620, and then try to EDIT, we will either have success or an error due to an undefined line. If we use the ON ERROR GOTO and RESUME statements, the auto-editor will keep going until it finds the next line.

This program listing works perfectly in my Model III. I load it in from tape before entering any code in my machine, and when I'm ready for the auto editor, I simply turn line 4 into a remark statement by inserting a single '. The program then works as described by Mr. Rollins: That is, initializing with a LIST of the line where I want to start, followed by a RUN <enter> each time I want to edit the next line.

I used one as the value of N to be sure that I didn't miss any lines. The only drawback of this is that if there is a large jump in the program lines, it takes a while to find the next line. If the program was written with all line spacing equal to ten, the

Continue to page 25

80 DEBUg

Mem Size. . .20K

Many readers who built the 4K or 16K memory board in accordance with my article ("Mem Size. . .20K!") on p. 116 of the Nov. 1980 issue have contacted me concerning loss of data in the added memory block—especially the 16K add-on.

I experienced the same problem when the circuits for both the 4K and 16K blocks were built and under test. Difficulties with the 4K block disappeared when additional filtering and bypassing were added onto the —5V line on the memory board. The —5V supply is very lightly loaded by the memory chip; as a result, this supply line is very susceptible to noise. Two or three 50 or 100 MF electrolytics and a handful of .01 to .1 MF disk sprinkled up and down the —5V distribution line should bypass the noise picked up on this line.

If you connect an oscilloscope to a not properly bypassed —5V line, you will probably see at least one-half volt of noise. Add large and small bypass capacitors until the noise signal voltage is radically decreased.

Bypassing will cure many ailments with the 16K memory board. The major cause of other difficulties is the addition of fast (200 or 250 ns) memory chips external to the keyboard if the chips inside the keyboard are the standard 450 ns speed. If all else fails to settle down operations of the 16K add-on memory board, swap those fast chips with the ones inside the keyboard.

W. R. Stanley
City Rt. 5, 204 Avery Ln.
LaGrange, GA 30240

Auto-Edit Bug

The program AUTO-EDIT 1 (Listing 1) in your February 1981 issue has a bug. The program should produce EDIT mode for consecutive program lines by typing RUN. As written, it skips every other line.

Here is the corrected program (corrections underlined):

```
1 CLP = PEEK(16620) + PEEK(16621)*256 :X =
17129
2 LN = PEEK(X + 2) + PEEK(X + 3)*256
3 IF LN <= CLP THEN X = PEEK(X) + PEEK
(X + 1)*256 :GOTO 2
4 POKE 16620,PEEK(X + 2) :POKE 16621,PEEK
(X + 3)
5 EDIT
```

Dan Rollins
370 N. Cerritos, #15A
Azusa, CA 91720
Micronet ID# 70250,631

Triple Play Bug

In the article "Triple Play For T-BUG" in your October issue, Mr. W. H. Johnson describes how to move T-BUG to a new location in memory. I have tried to use the program he describes, and after spending some time trying to get it to work, I can say confidently that there is a mistake in the data. The data block in Table 1 shows that location 2B3B should be filled with a 73. That location should in fact be a 74 to make the resulting new T-BUG run correctly.

Allen Davidson
3502 Crystal lake Ave.
Crystal Lake, IL 60014

STAND UP, CP/M USERS

For the past few months you have patiently endured the indignity of watching your friends show off their flashy visible number cruncher on their game-playing computer and longed for something as slick.

You seriously considered buying *their* computer, but you just couldn't give up the benefits of the CP/M operating system.

Well, say hello to TARGET™, the best business planning system available on micros today (and some big computers besides).

Talk about a blank ledger sheet or columnar tabulator! TARGET™ is much more than that. Sure, just like their product, you can fill in the rows and columns as you see fit and the numbers will whiz by you on the screen. But, we let you create your report in English, not in some combination of reverse Polish notation and algebraic matrix languages.

Our TARGET on *Your* System. . .

```
LINE 1 SALES = 100 200 300 400
LINE 2 EXP   = GROW 50 BY 15%
LINE 3 NET   = SALES - EXP
```

Their Product on *Their* System . . .

```
SALES 100 200 300 400
EXP 50  +B2*1.15 +C2*1 +D2*1.15
NET  +B1-B2 +C1-C2 +D1-D2 +E1-E2
```

At least, that is what their product might look like if you could see all of your data and calculation rules at the same time, *which you can't.* If you think that it is an easy approach for debugging, guess again.

TARGET™ displays a full screen of results or data and calculation rules at your command. And, it runs on your system. How much more could you ask?

Lots! And TARGET™ delivers. We give you the ability to:

- Obtain hard copy printouts of *both* the results *and* your set of data and calculation rules used to create those results.
- Write the results of data and calculation rules to the disk as formatted files for word processing.
- Use full conditionals (IF . . . THEN . . . ELSE) in your set of rules and stack conditionals within conditionals.
- Build powerful models with commands such as GROW, MIN, MAX, AVE, CUM, GREATER, LESSER, SUM.
- Edit lines with ease.
- Enter rules and data in any order you wish. TARGET™ will automatically sort rows in ascending order *and* process your model correctly even if LINE 33 SALARIES needs to be calculated before LINE 3 EXPENSES.

There is so much more about the TARGET™ Planner that will impress you. Our manual explains not just what a command or function is, but how to use the functions in everyday business situations. Our manual and our newsletter give you illustrative examples of business planning problems and how TARGET™ can help you solve those problems. For example, we will show you how to quickly determine the payback period for a proposed project.

TARGET™ is a compiled system running under CP/M. There is no need to buy BASIC or FORTRAN or any other system software. And the price is *only $195* for the TARGET™ Planner, our basic system.

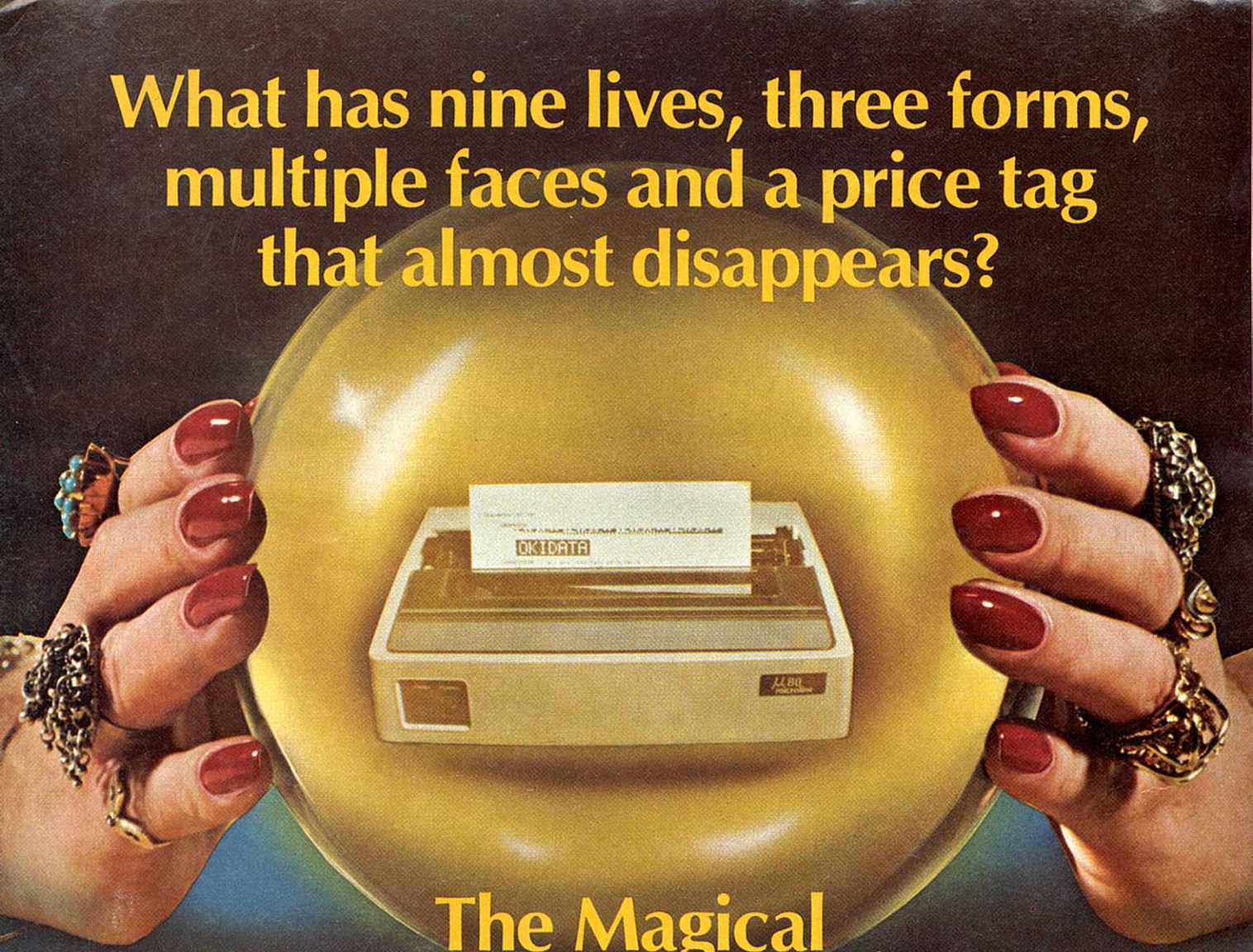
Stand up and be proud, CP/M users. The best business planning system runs on the best operating system on *your* computer.

Advanced Management Strategies, Inc.
1935 Cliff Valley Way, N.E., Suite 200
Atlanta, Georgia 30329
404/634-9535 ✓260

P.S. When all of your friends start drooling over *your* product, tell them to cheer up. With Microsoft's great SoftCard and 16-K memory board, your friend's Apple can move up to your operating system and run TARGET™.

CP/M is a registered trademark of Digital Research.
SoftCard is a trademark of Microsoft.
TRS-80 is a trademark of Tandy Corporation.

What has nine lives, three forms, multiple faces and a price tag that almost disappears?



The Magical Microline 80 Printer

It's magic! Well, almost. The Microline 80 will run all day at 80 cps with no duty cycle limitations. The head is warranted for 200,000,000 characters. That translates to over nine years on your TRS-80,™ APPLE® or other small computer.

Want to change forms? The magical Microline 80 is three printers disguised as one. There is a whisper-quiet rubber platen for cut sheets and roll paper, pins on nine inch centers for pin feed stock and optional snap-on tractors that adjust to suit all your other forms. The Microline 80 also saves paper by letting you tear off as close as one inch from the last print line.

Want to change your image? The magical Microline 80 really does tricks. It prints upper and lower case, condensed and double width characters *and* block graphics for charts, graphs and diagrams.

The Microline 80 is not a toy. With two motors, a rugged cast aluminum base and a head you never have to throw away, the Microline 80 is built to handle the most demanding business applications.

Which brings us to the biggest magic of all, the price tag, the one that almost disappears. If we're not the lowest, we are so close that it doesn't matter. There are stocking Microline distributors throughout the country. Call or write today for the name of the one near you and the price of the Magical Microline 80.

OKIDATA

Okidata Corporation, 111 Gaither Drive, Mount Laurel, New Jersey 08054 609-235-2600

Okidata is a subsidiary of Oki Electric Industry Company, Ltd.

✓245

value in line six can be changed to CLP = CLP + 10 to speed things up. Alternatively, a break and LIST can identify the next segment and the CLP can be reinitialized by LISTing the first line.

I like my Model III very much, but I hope somebody writes an article which does a little better job of describing how the differences affect the use of Model I hardware and software. Right now I'm afraid to buy a lot of the attractive materials available for Model I for fear that I won't be able to make them work.

Richard H. Reitz
Midland, MI 48640

```
4 GOTO10
5 ON ERROR GOTO9:CLP = PEEK(16620) + PEEK
  (16621)*256
6 CLP = CLP + 1:MSB = INT(CLP/256):LSB = CLP – MSB
  *256
7 POKE 16620,LSB:POKE 16621,MSB
8 EDIT.
9 RESUME 6
```

Recommends MicroCompatible

A word of praise for MicroCompatible of Scaly Mountain, NC, for their Model I upgrade (advertised on page 206 of the February 1981 issue).

Before spending $200 for the device, I called MicroCompatible and finally ordered the upgrade kit. I was amazed to find that it arrived at my home within four days of my telephone order.

I immediately plugged it in and it played like a charm from the very first touch of a button.

The service is not only excellent, but the product appears to be very well made and performed in all respects as advertised. This is somewhat of a novelty to me after having purchased a lot of worthless hardware and software trying to weed out the good from the bad.

One thing MicroCompatible doesn't tell you is that they also provide a very convenient reset button in an accessible location. There is also a capability of high speed disk operation if you have a disk operating system that will support this.

My hat is off to a good product and I recommend it to anyone.

Larry R. Moore, P.E.
Moore-Bingham & Associates
Cedar Rapids, IA 52401

Micro Development

Our firm, Suncoast Micro-Systems, is a private, not-for-profit corporation with a primary objective to assist in the development and placement of microcomputer systems within community-based, public service and charitable organizations. In our view, development of microcomputer systems within this market sector has been impeded by existing funding regulations and a lack of familiarity with computers among governmental funders and local agency personnel alike. We intend to assist in bridging that gap by providing information and assistance to local public service agencies that have a preliminary interest in microcomputer applications.

We seek contact and collaboration with other non-profit groups that are trying to catalyze appropriate software and training materials for community based agencies.

Joseph J. Spatafora
Senior Associate
Suncoast Micro-Systems
1870 Sailfish Rd.
St. Petersburg, FL 33707

Zoom! Friend

We're all too familiar with companies whose interest ends with the sale. I wish to point out an exception.

After the purchase and use of a Zoom 3.6 from Zoom!, Nashua, N.H., I experienced a minor difficulty with the software. I placed a phone call to Martin Tobias of Zoom! and in the week which followed received four long distance calls from him.

The problem was rectified and the product exceeded my expectations. We wish to thank Mr. Tobias for impeccable service and a useful tool.

John Parsons
Nutrihealth Information Systems
Waxahachie, TX 75165

Short Pencil

For several months I have been using the cassette-based Electric Pencil for preparing manuscripts and letters using single sheets of 81/2 × 11 inch paper. Since the Electric Pencil does not automatically pause at the end of a page, I have to watch the printer carefully and stop the program manually so I can insert a new sheet of paper.

The tediousness of this task finally got the best of me, and I decided to investigate the program to see if I could modify it so it stops at the end of a page. After a lengthy search through the code, I located the spot at which the program tests for the final line of a page. At this point the program jumps to the page spacing routine. By changing only two bytes, I altered this jump to a return to the main system. Now when the printer reaches the end of a page, it stops, and I can load a fresh sheet of paper at my convenience.

The changes I made are detailed below:

Location	Initial Code	Disassembled	New Code	Disassembled
4F3B	CD	CALL 5283		
4F3C	83			
4F3D	52			
4F3E	35	DEC (HL)		
4F3F	28	JR Z,8	C8	RET Z
4F4O	06		00	NOP
4F41	0D	DEC C		

Only bytes 4F3FH and 4F4OH are changed, to C8 and 00 respectively. This change can be accomplished by using T-BUG relocated to high memory. After the change is completed, a new system tape may be written from T-BUG. The starting address is 4350H, the ending address is 5374H, and the entry point is 4350H.

This new version of Electric Pencil cannot print continuously, since the alteration forces it to stop at the end of a page. However, if I need continuous printing, I can always use the original program cassette.

Rodney Schreiner
Madison, WI 53715

ONE LINERS

The First One-Liner

From time to time readers have addressed themselves to the problem of finding the file name of System tapes. This has usually resulted in a lengthy program to find the name.

Jon Ledbetter showed me a one-liner that has proven very useful for determining file names for Model I TRS-80's:

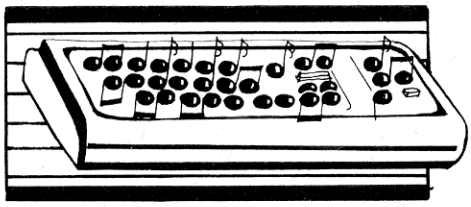
```
10 INPUT #-1,A$:PRINT A$
```

Robert Moran
Box 43
Sheldon, MO 64784

80 REVIEWS

Edited by Pamela Petrakos

"Synthesizer technology has advanced greatly... today we have synthesizers that are a fraction of the size and cost of the early models, yet with greater capabilities."



Music Master
Instant Software
Peterborough, NH
$7.95

Keynote
Hayden Book Co., Inc.
Rochelle Park, NJ
$9.95

by Jim Heid

The use of computer-like circuitry for music generation is not a new concept. The first electronic synthesizers were developed over twenty years ago. They were massive devices that looked like a cross between an organ and a telephone switchboard.

Synthesizer technology has advanced greatly since then, and today we have synthesizers that are a fraction of the size and cost of the early models, yet with greater capabilities.

Microcomputers can also be used to generate musical tones, using the same theory as large synthesizers. This article will describe this theory, and review two music oriented software packages for the TRS-80: Instant Software's Music Master, and Hayden's Keynote.

Sound Information

Sound is made up of variances in air pressure called sound waves. The more times per second these waves pulse, the higher the sound's pitch (Fig. 1). The greater the fluctuation of the waves, the louder the sound's volume (Fig. 2). The more variations there are in the waves, the harsher the sound's tone color (Fig. 3). Instruments like drums and cymbals produce harsh, erratic sound waves; instruments such as violins and flutes produce purer waveforms.

Microphones translate variances in air pressure into variances in electric current, very much like the human ear does. The minute current supplied by the microphone is fed into an amplifier to boost its strength (or amplitude), and then sent to a speaker which translates this current back into variances in air pressure.

By measuring a sound's waveform—its pitch, volume, and purity—at fixed intervals, it is possible to create a data table containing all of the sound's characteristics. The shorter the interval between measurements, the more accurate the information about the sound will be. Then, by instructing an electronic circuit to recreate the voltage variations at the same intensities and intervals as they occurred when they were measured, the sound can be accurately imitated, or synthesized.

The accuracy of the data and the extent to which it is recreated determine a synthesized sound's quality. The more accurately we duplicate what occurred when the sound was made, the more the synthesized sound will resemble the original.

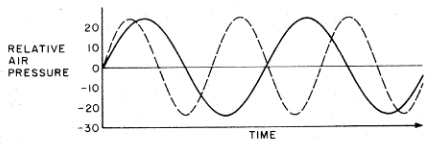


Fig. 1. The dotted line is a high frequency sound; the solid, a low frequency sound.

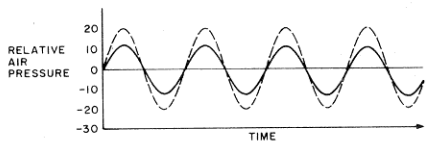


Fig. 2. The dotted line represents a louder sound; the solid, a softer sound. (The sounds are of the same frequency in this diagram.)

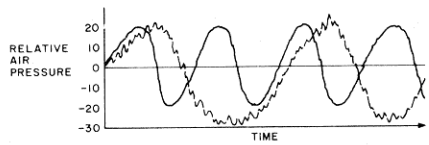


Fig. 3. The dotted line represents a hard sound, such as a drum or cymbol. The smoother line represents a purer sound, such as a violin or a piano.

The most modern electronic synthesizers use a digital representation of the soundwave. This representation is a highly accurate computer rendering of the original sound, and is often recorded on floppy disks and loaded into memory as needed. This method, while very complex and expensive, is the most accurate and often it takes an expert to discern between the original and the synthesized version.

Although precise sound synthesis requires more circuitry than is present in a microcomputer, the theory can be demonstrated with good results using software and, in some cases, a small hardware addition.

Music Master

The Music Master software package consists of a Level II cassette tape containing four programs: Micro Organ, Kaleidopy, Keymania, and Composer. All will run in 4K of memory, and require that the computer's cassette output cord be attached to an external amplifier.

The first program, Micro Organ, is a machine language program that turns the top two key rows of the computer into an organ keyboard on which one note or voice can be played. The user has a choice of three tone colors, which Instant Software calls piano, organ, and harpsichord. These names are, however, just labels, because the tone of each does not accurately represent its namesake.

Another drawback of this program is the lack of a keyboard buffer. The user must release the first note before the second note can be played. Failing to do this will cause the first note to sustain, even though the user may be pressing a different key. The user must adapt to this by releasing the first note, pausing a split second, then playing the second note. This results in staccatto sounding music.

This program provides a live keyboard, meaning that the music is played as soon as the keys are struck. There is no way to save each musical piece, except to record it with a microphone as it is played.

The second program, Kaleidopy, generates random musical notes, and produces a graphic design on the screen as it plays the notes. It is entertaining for a few min-

utes, but after that, each piece starts to sound the same.

The third program, Keymania, is more of a game than a music generation program. In Keymania, random notes are played and the players (up to four) are required to replay the notes in the same order that they were heard. The more notes that the player requests, the harder it is to recall each one. This game can be quite challenging and fun.

Composer is the final program in the package, and in my opinion, the least valuable. Like Kaleidopy, this program generates random musical notes, but plays them in user-selectable keys and tempos. It also repeats certain sections of the random musical piece, in order, according to the instructions, to relieve some of the boredom associated with totally random music. But to me, repeating random music at random intervals still gives random music, which is boring.

Music Master is a fair package, ideal for demonstrations and for the person who is interested only in occasional experimentation with computer music. Its price is very reasonable and its quality and documentation are good.

Keynote is Level II machine language/BASIC program which requires a minimum of 16K RAM to operate. The program permits the user to enter a musical piece using a special mini-language in which symbols are used to label a note's pitch and duration. The resulting piece can be edited and saved on cassette if desired.

To use the program, the sound generating machine language program is loaded into a memory area that has been protected using the MEMORY SIZE question. After the program is loaded, the BASIC program is loaded. The BASIC program contains the routines for entering, editing, and saving the musical piece.

The program's synthesizer features a five octave pitch range, three possible tempos (slow, moderate, or fast), and the ability to repeat certain sections of the piece. Keynote also features extensive error-trapping routines that result in smooth program execution.

After the musician has entered his/her song, he/she may choose from a multifunction options list to edit and review the piece, play the piece, or save the piece on tape. The edit option displays the contents of the piece in 40-note increments. The user may choose to view the next 40 notes, to change a certain note(s), or to repeat a certain part of the piece. The play option compiles the notes that have been entered and plays them through the computer's cassette output. The tape save option allows the user to save a piece and replay it at a later time.

This package has some negative points, however. The execution time of the BASIC program is slow, especially in the edit and review mode. The tape SAVEs and LOADs also get quite long. Execution time can make or break a program's effectiveness for frustration-free use, and Keynote is just too slow. The program also supports only one voice at a time, limiting the piece to melody—not enough for serious music programming.

Keynote is, however, an excellent program for the newcomer to computer music who would like to try it without committing himself to a large expense. The quality of Hayden's software is outstanding, and their documentation is good. For occasional use and for demonstrations, Keynote rates as a good buy.■

The Music Box
Newtech Computer Systems, Inc.
Brooklyn, NY
$149

by Terry Kepner and Erich Whitey

The Music Box claims to be "...a sophisticated facility for the composition and performance of music operating on the TRS-80 Microcomputer." Unfortunately, while it does fulfill this claim, it falls a bit short of actually being a truly versatile tool for the serious music student.

Documentation

The software manual is 71 pages thick, confusing, and incomplete. Written by the author, it falls into the trap in which most author-written manuals trip. Because he knows the software so well, he tends to give incomplete explanations. For example, a diagram is given (see Fig. 1) which, according to the manual "... shows the relationships among the five programs and the way in which files are passed from one to the other." Nothing further is mentioned about it. I am sure he knows how to interpret it, but we didn't.

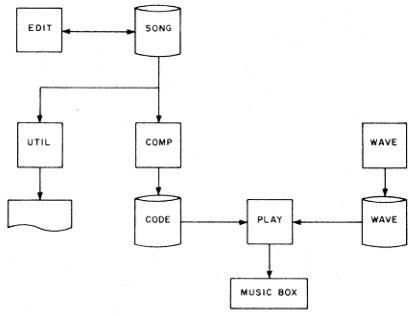


Figure 1.

Also, author-written manuals tend to overlook little details and tricks of use that make it easier to operate. In fact, he spends a good deal of space bragging about all the neat little things you can do with his software instead of giving examples of how to use the routines to achieve desired effects.

The hardware manual, a preface of eight pages added to the software manual, gives instruction on how to hook The Music Box up to your computer. These instructions are, by contrast, impeccably prepared. They not only tell you how to connect it, but also explain the electronics in detail, provide a complete listing of all the parts, include a schematic labeling of all the components, and even give the physical layout of the components on the circuit board!

Statistics

The Music Box's statistics are rather straightforward:

- It plugs into either the keyboard, or the expansion interface.
- It includes all the software needed, as well as all the extra hardware needed, except for a speaker (i.e., it contains its own audio amplifier in addition to its digital-to-analog electronics and power supply).
- It is well built.
- Songs may contain from one to four voices, each voice has an octave range of seven, starting at 27.5 Hz.
- The note range extends from the whole note down to the sixty-fourth note, including 1/5's and 1/7's of each of these.
- Notes may be dotted or double-dotted.
- Measures, repeats, refrains, triplets, and microtones are all possible.
- The wave form used to generate sound is accessible and can be changed at any time, including during the playing of a composition.

The software itself is divided into five programs: Edit, Comp, Wave, Play and Util.

Edit

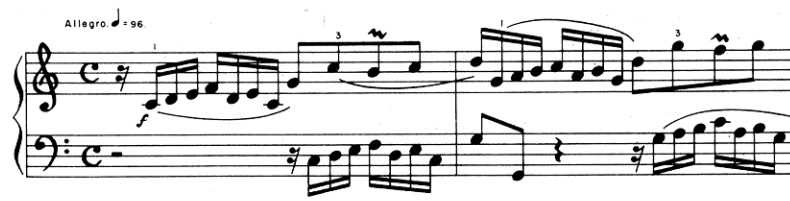
The Edit program is used to enter music into the memory of the computer, and to

change music already composed. The editor is very straightforward, supplying cursor, page, measure-step and home functions. Unfortunately this straight-forward approach is a liability, being a little too clumsy for any real professional, or even a beginning student of music.

For a programmer it is even worse (I've been spoiled by the R/S line editor). Entering a small 22 measure song in three-four time took over three hours, which included interpreting the manual instructions and experimenting. Each note is treated as a different line in the editor. However, all four voices for that note can be placed on the same line. See Fig. 2, a transposition of Bach's Invention #1.

There is one major restriction imposed by the Editor: If more than one voice is selected, all the voices called to play at the same time (i.e., all voices on the same line number) must play for the same duration. For example, when voice number one has an eighth-note duration, voices number two and number three, and number four are all played for an eighth note duration, even if the music calls for a longer or shorter time in these other voices.

The next restriction is not major, but it is very annoying. If for some reason you don't want to save the file just typed into the editor, the program will not let you exit unless you reset your computer, otherwise it will attempt to save your newly modified file (which will lock-up your computer if you're in Level II BASIC, or write the new file on top of your old disk file). In other words, you are often trapped in the editor, or even some sub-editor functions, involuntarily.



Line	Duration	Voice 1	Voice 2	Line	Duration	Voice 1	Voice 2
	*V 2				*M 0001		
0003	S	R@4	R@3	0022	S	D@5	G@3
0004	S	C@4	R@3	0023	S	G@4	G@3
0005	S	D@4	R@3	0024	S	A@5	G@2
0006	S	E@4	R@3	0025	S	B@5	G@2
0007	S	F@4	R@3	0026	S	C@5	R@2
0008	S	D@4	R@3	0027	S	A@5	R@2
0009	S	E@4	R@3	0028	S	B@5	R@2
0010	S	C@4	R@3	0029	S	G@4	R@2
0011	S	G@4	R@3	0030	S	D@5	R@2
0012	S	G@4	C@3	0031	S	D@5	G@3
0013	S	C@5	D@3	0032	S	G@5	A@4
0014	S	C@5	E@3	0033	S	G@5	B@4
0015	T	C@5	F@3	0034	T	G@5	C@4
0016	T	B@5	F@3	0035	T	F@5	C@4
0017	T	C@5	D@3	0036	T	G@5	A@4
0018	S	B@5	D@3	0037	T	F@5	A@4
0019	S	C@5	E@3	0038	S	G@5	B@4
0020	S	C@5	C@3	0039	S	G@5	G@3

Figure 2.

Compiler

The Compiler converts the music from the notation used by the editor to the numerical form required by the Play program. Although it doesn't take too much to operate, it is a slow and tedious process to wait through. I have seen (and reviewed) other music systems that compiled their data while in the editing section of the software, and a good deal faster too.

Wave

This program creates and stores new sound waveforms (also called colours, or instruments). These waveforms are used by the Play program as the sound by which notes are generated. For example, a harpsichord-like sound can be generated by specifying the proper waveform. Unfortunately, unless you have had courses in phase angles and relative amplitudes (heavy on the math), the Wave program will mean nothing other than a series of puzzling numbers.

This is a spot where the manual has failed to supply sufficient information. It tells you how to specify the fundamental and the harmonics, but does not tell you which ones will produce standard effects such as the harpsicord or organ. This is left to you to experimentally discover.

Play

Play brings everything together: the waveform, the music and the player. You actually have three modes of operation. The first is simply play the music, the second is rehearsal, the third is interactive.

Rehearsal lets you use the computer as a musical practice partner. Program your music to play the pieces you want to practice, leaving out those portions you will actually play yourself. Start the song and play your instrument, with the computer accompanying you along the way. At predetermined places you can stop the music, tell the computer where you want to pick up, and then continue, repeating portions as many times as necessary. Interactive mode allows you to assign (while in the Edit program) refrains of music to certain keys on the keyboard. When you play the music, you can force the computer to switch to any given piece by pressing its associated key. This is very, very good for composing avant-garde pieces.

Utility

This is supposed to be a special utility designed to use the RS-232 port. There were absolutely no instructions on how to use it (although the table of contents mentioned a subsection of Util, it wasn't anywhere in the manual), merely a fast list of its functions:

- Obtain a print-out of music in memory
- Receive a song from the RS-232
- Send a song to the RS-232
- Receive a waveform file from the RS-232
- Send a waveform file to the RS-232
- Set the baud rate of the RS-232 from 110 to 96 (this last function is puzzling. I believe the author means "set it anywhere from 110 to 9600"; but then what about stop bits, parity, etc.)

I did manage to get a listing of my song, but there were a few unexpected (and unexplained) stray symbols intermixed among the normal characters.

Overall

The main advantage of the program lies in its technical versatility. Microtones are useful in achieving Eastern musical effects, and along with the wide variety of

NEVER UNDER$OLD.

Thats right. If you can find a lower price in this magazine WE WILL BEAT IT! Period.*

SPECIALS

SPECIAL #1 . . . . $44.50
TRS-80 Disk and Other Mysteries Book, Box of Verbatim Diskettes, and a Plastic Library Case.

SPECIAL #3 . . . . . $149
Apparat NEWDOS/80, Box of Verbatim Diskettes, and a Plastic Library Case.

SPECIAL #4 . . . . . $190
Microsoft Basic Compilier, Box of Verbatim Diskettes, and a Plastic Library Case.

SPECIAL #5 . . . . $49.95
Microsoft Basic Decoded and Other Mysteries, Box of Verbatim Diskettes, and a Plastic Library Case.

PRINTERS

EPSON MX-80	CALL
MX-80 Graphics ROM	CALL
NEW EPSON MX-80 TF	CALL
Okidata Microline 80	$415
Okidata Microline 82	$625
Okidata Microline 83	$899
IDS Paper Tiger 460G	$1050
Anadex DP-9000,1	$1195
Anadex DP-9500,1	$1295
Centronics 737	$689
NEC Spinwriter	$CALL
NEC w/ Sellum Option	$CALL
Starwriter 25 cps	$1440
Starwriter 45 cps	$1770
Malibu 165	$1995
MPI 88G	$495

TRS-80 HARDWARE

TRS-80's	$CALL
Micropolis 77 track	$399
Percom Doubler	$199
Percom Separator	$27
Orchestra 80	$79
Shugart 40 tr.	$299
Pertec 40 tr.	$299
MPI 40 tr.	$299
16K Memory Kit	$19.95
Cat Modem	$145
D-Cat Modem	$155
Lexicon Modem	$125
Verbatim 525-01	$26.50
Verbatim 8" DD	$44.00
Isolator ISO-2	$49.95

NEW! Double Density Special

A Percom Doubler, Apparat's NEWDOS/80, Double Zap II [to convert the NEWDOS/80 to single and double density], a box of Verbatim Datalife diskettes, and a Plastic Library Case. A $436 Value...for

$359

Send For Our New Free Catalog!

***Include $2.00 shipping and handling on all orders. Visa and Master Card accepted. Never undersold offer applies only to items currently deliverable from other retail vendors at advertised price. All never undersold offers good as supply lasts. Please add $2.00 for all COD orders. Please call for items not listed. We gladly answer any questions on all of our hardware, software, and supply needs. Quanitity discounts available. School purchase orders accepted. Please remember to figure competitors shipping and handling charges when arriving at never undersold price.**

POWERFUL SOFTWARE

Racet's New DISCAT $45
This New machine language disk catalog program will help you keep track of your programs in a neat, orderly library. It can catalog up to 1900 programs in each of 9 categories for a total of 17000 program location records.

Snapp Spooler $90
Fully automatic print spooler for the model I. Increases your computers efficiency by freeing the computer while printing.

TRACKSESS $24
This is the complete disk zap utility, capable of copying standard and non standard formatting. The dynamic editing allows you to change any byte in any sector with amazing ease

SCRINPUT $29
Format your screen displays and input routines with this machine language subroutine. Gives your program a more professional look.

INTRODUCING ALPHA BYTE'S 24 HOUR EXPRESS SERVICE..

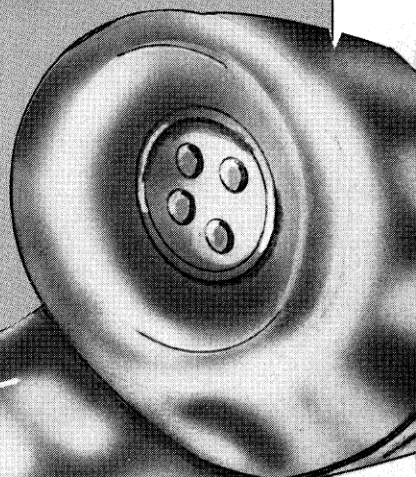
It's fast and reliable. Just dial our number. If the product is in stock, it's sent on it's way--ALWAYS WITHIN 48 HOURS--If we don't ship it within 48 hours you get a 10% discount. Guaranteed. We are out to be YOUR one stop shopping place.

213-883-8594

ALPHA BYTE STORES

69

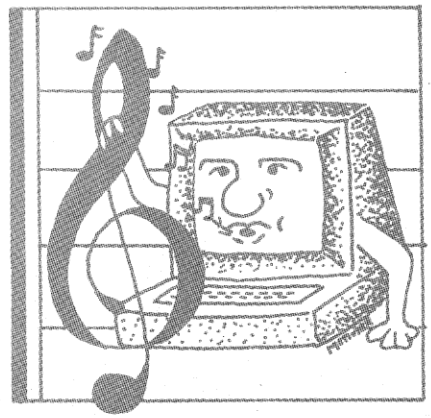
5115 Douglas Fir Road
Suite B
Calabasas, California
91302



possible note lengths, can be extremely valuable in creating original, unconventional compositions. In addition, the rehearsal and interactive modes of the Play program greatly enhance its usefulness in the creation of music.

Its main disadvantage lies in its poorly written manual. The first music student to whom I showed The Music Box gave up after reading only halfway through. She objected strenuously to the repeated use of computer jargon and to the poor organization of the manual. Although she is not a computer hobbyist we have worked together on other music packages for the microcomputer and produced rather thorough reviews, so she is not unqualified to evaluate this type of package. Consequently, I must warn the non-computerist, this package is not easy to learn.

Yet, if you are computer music enthusiast and you want to experiment with unusual sounds and special effects, then you might want to try this package. ■



Orchestra-80
Jon Bokelman
Software Affair
Santa Clara, CA
$79.95

by Jim Heid

Sometimes a product is marketed that is of such good quality and value that it soon becomes the standard in its class.

Orchestra-80 is this kind of program. This hardware/software combination for computer music generation is so versatile, so easy to use, and so reasonably priced that it deserves to become the standard in its class.

The hardware half of Orchestra-80 consists of a one and a half by two inch printed circuit board that attaches to the TRS-80's keyboard edge connector, or to the expansion interface's bus extension. It is then connected to an external amplifier, using a standard RCA type cord. The circuit board consists of an IC, a capacitor, and a dozen resistors, making up a digital to analog converter that converts the binary data coming out of the computer into a high quality audio signal. The board requires no additional power supply, and can be left in place when not in use. It must, of course, be detached in order to use the edge connector for any other peripheral.

"The compiler will accept music written in any key, any time signature, and any note value from whole to sixty-fourth notes."

The Orchestra-80 software, a 16K machine language program, contains:

- A Digital Synthesizer
- A Music Language Compiler
- A Text Editor
- A File Management System
- An Initialization Routine.

The synthesizer features a six-octave range and four simultaneous voices (the ability to play up to four notes at the same time). Although the synthesizer voices are preprogrammed to simulate a trumpet, an oboe, a clarinet, and an organ, the voices can easily be re-programmed using the Initialization Routine.

Orchestra-80 uses its own language to input musical pieces. In this language, every note within the system's range is given number or letter, along with a few other codes signifying key, tempo, and other codes signifying key, tempo, and voice, a musical piece can be entered very quickly and easily. The language is extremely simple, yet has all the capabilities needed for serious computer music.

The compiler will accept music written in any key, any time signature, and any note value from whole to sixty-fourth notes. Notes may be single, double, or triple-dotted and/or played as triplets. Accidentals, staccatto, and pizzicatto notes are available. Also provided are two forms of articulation and the provision for repeats, second endings (with or without retard), and modulation.

One of this program's best features is its text editor. The Text Editor provides a fourteen-line text display area and a two line status display area. The status lines are located at the top of the screen, and the file scrolls up and down below them. Fourteen lines of text are viewable at one time, and a blinking cursor can be positioned anywhere within the file by using the arrow keys on the keyboard. The keyboard is fully debounced and all keys will repeat when held down. Additional functions include insert or delete character, insert or delete line, and a global character string search. The contents of a file can be listed on a line printer, and the computer will not lock up if a printer is not attached or not ready.

The File Management System is an equally impressive feature of Orchestra-80. This system provides for orderly storage and retrieval of user files on tape or disk. All files are named, and the disk version adds the extension "/ORC" to the filespec. By typing D, the program will display a directory of all files on a given disk with the /ORC extension. The disk and tape files are compressed when written, allowing fast retrieval and reduced disk/tape space requirements. A special command lets the user enter the names of as many files as he would like the system to perform. The computer will then call the files to the screen and play them successively.

The Initialization Routine allows the user to alter the tone colors of one or more of the four registers, to achieve special effects or special dynamics. The altered program can then be saved on tape or disk with its own file name, eliminating the need to go through the initialization dialogue in the future. The disk version adds the extension "/CMD" to the user-selected filespec.

Orchestra-80 is also extremely well documented. The package comes with a 39 page typeset manual—a refreshing change from the typewriter and mimeograph manuals so many companies are providing. The manual gives full instructions on set-up and use of the Orchestra-80 system, including an important section for non-musicians on reading sheet music.

Software Affair's Orchestra-80 represents a best buy in computer music systems. Its price is less than half that of comparable systems, its documentation is thorough, and its operation is bug free and enjoyable. ■

FLOPYCAT/BAS
DISK NAME/BAS
Marvin Plunkett
Microcomputer System Consultant
Roseburg, ORE
$30.00
$15.00
$40.00 (for both)

by G. Michael Vose

Anyone who has struggled through three or four boxes of floppy disks trying to spark a memory as to where you put that great program you wrote, will be happy to learn about this new disk library program from Marvin Plunkett.

The program has been pegged with the rather inelegant moniker, FLOPYCAT/BAS, but the inelegance stops there. Everything else about this program is indeed elegant.

First Rate Presentation

First of all, it is fast. Using machine language subroutines relocatable for sorting and other high level tasks, this BASIC program works as fast as any high quality word processor. These subroutines are tucked into REMark statements to make the program easy to use while saving disk and memory space.

Second, FLOPYCAT/BAS is easy to use. The screen presentation is first rate, all prompts are well laid out and easy on the eye. The screen is never cluttered. Marv Plunkett understands that it is often the little things, like attention to detail, that make the difference in a quality product.

Most importantly, FLOPYCAT/BAS is versatile. You'll need a 32K minimum system to use this software and you'll be able to store 429 disk file names in that 32K. If you've got 48K, you can store up to 1084 file names. You'll be able to use manual input or let the program read the files automatically. You can read the entire library on screen, at any time, or you can print out the entire list. You can change file and disk names and delete files, as necessary. There are search routines to help you find a specific file and you can sort your disk library by disk name or file name.

The features of FLOPYCAT/BAS that I especially admired include:

- As it reads a disk into the library, each file name is flashed briefly on the screen.
- As each disk is read into the library, the used and vacant library space is listed at the bottom of the screen; you'll always know how much more data you can tuck away into that particular library file.
- When you print a list of your file library, the program lets you input a title for the list so that you can have separate lists for work disks, masters, game disks, Scripsit files, etc.

There is extensive error trapping built into the program. I particularly enjoyed being warned, as I was trying to exit to BASIC, that the file had been changed but not written to disk. I slapped my knee and chuckled at my limited memory space and wrote that file to the disk, pronto!

There are several disk directory programs on the market now. All are reasonably fast and efficient. Some hold more data than FLOPYCAT/BAS. But I give FLOPYCAT/BAS the edge because of the author's attention to detail, the overall polish of the screen displays and the user prompts. The documentation exhibits these same qualities and never bogs you down with unnecessary details. If you are interested in the details, the program documentation is available from the author for $30.

As a plus, for $10 more, you can purchase a companion program, equally elegant, called DISKNAME/BAS. This BASIC program allows you to change the names of your disks. You can choose whatever name you like (anything's better than TRSDOS 2.3!). For example, you could name your disks Games1, Games2, Education, etc., and then use FLOPYCAT/BAS to store the files using these names. Using these programs, your disks will be much easier to keep track of, and will result in instant organization! ■

BASCOM
BASIC Compiler for Model I
Microsoft
Bellevue, WA
$195

by Bill Sholar

BASCOM, as Microsoft calls their compiler, arrived with a loose-leaf binder containing several hundred pages of documentation, and two five-inch diskettes.

Interpreters are handy, especially in developing a program in BASIC. But interpreters have to perform an interpretation of the BASIC line every time it is encountered. That can be time-consuming, especially in loops.

A compiler, on the other hand, goes through the BASIC source program and generates a machine language version which can be saved on the disk. When that version, called the object program, is executed, there is no need for interpretation. The program executes at machine language speed. Microsoft promised an increase in speed of anywhere from three to 30 times over the interpreter's execution, depending on the program. (They explain that integers work faster, and offer an example. The routine FOR I = 1 TO 10:A(I) = 0:NEXT I will run 30 times faster if the user merely replaces I with 1%.) To test these claims, I ran a statistical program I occasionally use with the interpreter (Radio Shack's Disk BASIC 2.2). It took 23 seconds to complete the computations, as measured by the internal TRS-80 clock. For example, typing:

```
BASCOM filespec = filespec
L80 filespec, filespec-N-E
```

compiled the program. The compiled version should work faster, and it did. It ran in less than a second. That is some improvement!

The manual suggests that only programs which are debugged and are to be used several times should be compiled. It is, after all, a time-consuming process to compile a program, taking from five to ten minutes. But there may be occasions where you will want to compile a program for a one-time run.

To use BASCOM, it is necessary to write a normal program for the TRS-80 Disk BASIC interpreter (or use one you have already written). There are only a very few incompatabilities, which do not seem to be too important. (For example, my line IF Y = 0 THEN RUN had to be changed to IF Y = 0 THEN 10.) Then the program is saved in ASCII format. Two commands will generate, on your disk, a machine language version of your BASIC program. (With a single drive, you will need to swap disks a couple of times.) The process takes about five minutes.

Some Limitations

You need a 48K TRS-80 with at least one disk drive to use BASCOM. Two drives, especially 40 track ones, are better. (Although Microsoft doesn't mention it, you can save time by putting all of the compiler programs and data on a single 40 track data disk, and using a system disk for creating and storing your source and object code. This will save some disk swaps even for dual drive systems.)

At the moment, you can only run programs of about 16K or less in length. Although the compiler itself reads source

code from disk (and could, therefore, handle even an 80K program), the linking loader loads the program into memory. The object code and the run time system (this replaces the BASIC in ROM and RAM usually used by your program), requires substantially more memory than the original source code. With memory area already taken up by the loader, little room is left for lengthy programs.

Microsoft has promised, however, to send all registered owners of BASCOM a new linking loader disk which will allow larger programs to be compiled and loaded. They have also promised to send registered owners who request it a copy of their permanent manual as soon as it is off the presses, to replace the original loose-leaf manual.

The only other limitation is the inability of the USR(n) function to pass arguments to machine language subroutines. But there is a fix for that.

A Few Surprises

Included with the BASCOM documentation is a BASIC-80 Reference Manual. BASIC-80, also called BASIC 5.1, or MBASIC, is the BASIC you've probably seen advertised for CP/M and other operating systems. You may have noticed that it costs about what a new disk drive would cost. Well, smile, because purchasers of Microsoft's BASIC Compiler for TRS-80 Model I get BASIC-80 at no extra cost.

The BASIC-80 they provide has all of the features, including the ability to reset the width of your screen or printed display, WHILE. . .WEND loops, variable names with 40 significant characters, SWAP, and CALL (a fix for the USR(n) problem). However, you don't get the interpreter, meaning that you have to write the source code and then compile it before you can run it. (The Radio Shack Disk BASIC doesn't understand BASIC-80, needless to say.) To compile BASIC-80 instead of Radio Shack's Disk BASIC, all you do is type a one character signal indicating which form of BASIC you are using.

Errors in standard BASIC can be detected by running the program using the interpreter, and then correcting any detected errors. Mistakes in either Disk BASIC or BASIC-80 will show up, when being compiled, with error codes, the line containing the error, and an arrow pointing to the error!

Considering this compiler is the same software that is being sold for Model II and CP/M users for about twice that price, we Model I users are getting a real break! I heartily recommend BASCOM. It's like going from a cassette player to a disk drive again. ■

Kim's Game
General Computer Co.
Woodbridge, VA
$19.95 cassette
$24.95 disk

by Eric Maloney

Put this program, a keg of beer and 20 friends in your living room, and what have you got? The last party of yours that *those* people will ever come to.

Kim's Game, the "mind-expanding game of memory and recall," combines the excitement of math drills with the gaiety of Roget's Thesaurus to provide you and your guests with hours of unrelenting boredom.

In all fairness to General Computer, Kim's Game is far from shoddy. It is well-produced, well-packaged, and comes with a 36-page loose-leaf manual that includes the BASIC source listing. And it will probably do exactly what it promises—improve your memory.

The name is taken from the Rudyard Kipling novel, *Kim*, whose title character plays a memory game in which he must glance at a group of items on a tray then try to recall them. Kim the program substitutes words for objects, and gives the player points for each one that he remembers correctly. The words increase in number, length, difficulty and value to make the game more challenging.

But there is a huge difference between remembering physical objects—as Kipling's character does—and remembering words. The former is visually exciting, and offers players far more mnemonic options. Two people will perceive the same object differently, and these perceptions will change dynamically with variations in, for example, the object's environment, its distance from the player, its juxtaposition to other objects and its angle to the eye. In contrast, a word on a computer screen, is dry, static, flat, and lifeless.

The game does have one redeeming feature—it lets players add their own words. This provides a unique avenue of expression for the sexually deviant and socially depraved. Perhaps the game's true value lies in its potential psychotherapeutic applications.

Ultimately, though, Kim's Game quickly becomes Kim's Endurance Test. An improved memory may have its advantages, but this program makes forgetfulness look like an attractive alternative. ■

Astrology
Tandy/Radio Shack
Ft. Worth, TX
16K Level I & II
$29.95 cassette

by Dennis Thurlow

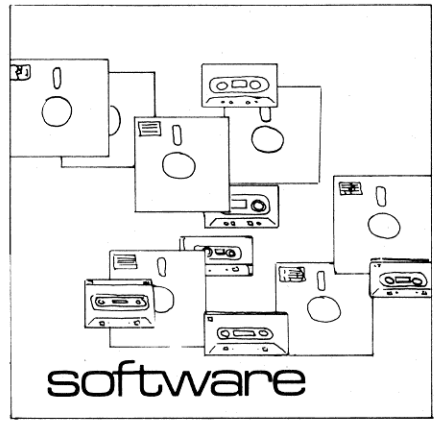
If your only previous experience with astrology is the column in the newspaper or the scales at the dime store, you probably won't be able to use most of the information produced by this addition to the TRS-80's software line. However, if you are a professional charter, you're going to wonder what happened to some very important information.

The non-professional user, who is less likely to have a printer, will find it hard to assimilate the long lists of data. That's why charts were developed. Yet the documentation to this particular program doesn't tell you how to make one. The professional, who is more likely to be able to afford a printer, knows how to make his own charts. So why write a program that only generates a chart on the printer?

When a subject's exact time of birth is not known, the list of houses and ascending sign (which is important to a complete astrological reading) is not given. The professional knows this is because estimating the time is not accurate enough for houses, but Radio Shack gives no explanation to the novice.

If the program was written with the professional in mind, then why doesn't it give heliocentric (sun-centered) aspects along with the geocentric (earth-centered) ones? Where is the median sign? The sidereal (star relative) time? Why are the calculations only accurate for the 20th century?

The program shortchanges both the professional and the beginner. It appears that Radio Shack software developers only got halfway on this one. ■



Cross References Utility
Robert Kilgus
Tandy/Radio Shack
Ft. Worth, TX
$14.95

by Stephen F. Nowak

Some people say that the TRS-80 is the most popular microcomputer because it has such a broad base of software support from so many different sources. There is a version of every game program on the market for the TRS-80, and most business programs are available in many forms for Tandy's favorite child.

Nevertheless, another important attribute of the TRS-80 is its ability to be easily programmed via its powerful BASIC interpreter. Most users buy some programs and write others. At first, programs are short, sweet and simple, but as the user gains familiarity with what BASIC can do, the programs get longer and more complex. We get more confident and freely modify existing programs to "improve" them.

Unfortunately, while writing a new program or improving an old one, we tend to lose track of which variables go where, and how we got to line 2050. TRON helps, but if there's a CLS between where we were and where we're going, it can become frustrating. The problem is further complicated if we reassign variables throughout the program after they've completed FOR-NEXT loops.

Fortunately, there is now a good solution available for this problem. Cross Reference Utility generates lists of references for the following important items:

Line numbers: It lists line numbers that are called by GOSUB and GOTO commands and the lines where those references exist.

Variables: It lists all variables that are defined or used, and each line where that variable appears.

Reserved words: It lists all reserved words and the lines where they appear.

If an item appears more than once in a line, the line number is listed as many times as the item appears. This is especially useful where there are multiple statements in a line with all of the extra spaces squeezed out for memory efficiency.

The program is used in Level II BASIC by loading it with the System command, after which programs can be examined by being read from cassette by the utility program. With a disk system, the utility is called from TRSDOS by its filespec, XREF/CMD, after which BASIC language programs are examined after being read from either disk or cassette.

Once the program is loaded, a series of prompts appear on the screen which must be answered with either a Y or an N:

PRINTER ?
LINE-NUMBERS ?
VARIABLES ?
RESERVED WORDS?
FROM DISK ?

Any combination of cross references may be chosen. The menu is almost idiot proof. If you inadvertently answer Y to the printer query without having a printer connected, the computer will tie up just as if you had entered LPRINT without a printer.

The program prompts you to ready the cassette or to enter the disk filespec. If you specify a non-existent file, it will respond with CAN'T READ! TRY AGAIN. If you attempt to load a file which is not a BASIC language program it will return the statement WRONG TYPE FILE! TRY AGAIN.

If you don't own a printer, the listing can be stopped by pressing the shift and @ keys simultaneously. If you wish to enter a new file, pressing the enter key will return the program to the "From Disk" query. To restart the program press shift and @ simultaneously and then enter.

At the end of a listing, the program allows you to re-examine the same file, load a new file, or exit.

The machine language program is sold on cassette, and comes with a well-written instruction manual, which includes a step by step (or, should I say, key by key) procedure for operating the program. The manual also includes a section with concise directions for transferring the program from cassette to disk using the TAPEDISK utility.

The manual looks larger than the information it holds, since someone decided to print the instructions on only one side of the page. Also included are directions for backing up a diskette, but the directions assume that the user has a two-disk system.

The shortcomings in the documentation are very slight, but are glaring when compared with the high quality of the program itself.

Radio Shack released this program in the fall of 1980, but the program itself displays a 1979 copyright date.

I feel that Tandy needs to catch up on quality in the software department, and this program is a giant leap in the right direction. ■

The Wizard
Richard Taylor
Programs Unlimited
Jericho, NY
$19.95 disk

by Joe Simon

As I was walking past a dealer's booth at the New York Computer Show I heard a pssst... Never being one to pass up a pssst... I immediately went over to check it out.

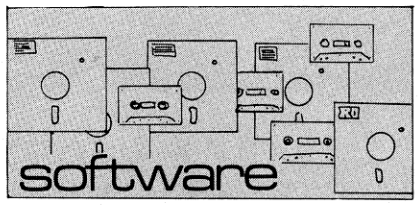
There was this evil looking fellow who asked me if I was tired of computer games that never went anywhere. With an affirmative nod of my head he sat me down and told me to choose a subject.

Doubtful that this program was going to be different from games I have played and shelved in the past, I reluctantly selected a subject. Suddenly, all hell broke loose; the TRS-80 started to make strange noises, the monitor began to flash and I found myself in a a battle against time to answer the questions correctly.

Needless to say, I was there for some time trying to prove I was smarter. It was a draw. I was so involved in the challenge that I didn't even notice the fellow looking over my shoulder, laughing and wringing his hands.

Anyway, I got the program and here is what it was. It's a program called the Wizard and is reminiscent of the coin arcade games that ask you a series of questions on various categories in exchange for points and a free game. It gives you a choice of five subjects: presidents, television, trivia, Star Trek, the movies, and general knowledge. you can play The Wizard alone, against the clock, or against another player.

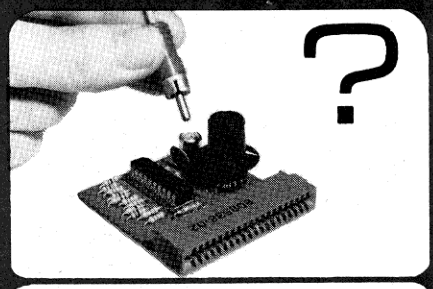
When two people play, you are not only pitted against the clock, you also play against your opponent who can steal your questions or force you to answer questions he rejects. When you answer correctly, points are added to your score. A wrong answer results in points subtracted from your score, and if you steal a question from your opponent and answer it wrong, double points are subtracted from your score.



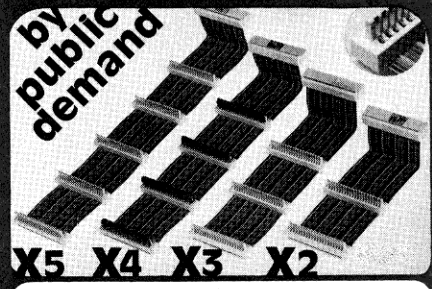
NEW

Joystick versions of the Fantastic Games by BIG 5 (see page 175) and Software Innovation (see page 49). Available on tape or disk, same price as plain version. One "Stick 80" works with all. Money back guarantee. In stock now.

STICK-80 MAKES KEYBOARD OBSOLETE.
Features the famous ATARI Joystick. 8 directions + fire control. Simple instructions to make joystick versions of most action games. Plugs into keyboard or expansion int... Price includes ATARI joystick with ALPHA interface and instructions. FREE "MAGIC ARTIST" program..... $39.95
Super Real Time Action Graphic Sound games for Stick-80 by Software Innovations: ALIEN INVASION, COSMIC INTRUDERS, BREAKOUT. Each $9.95
STELLAR ADVENTURE: super action with sound $14.95
Software authors and distributors: contact us for joystick conversion package for your existing games.

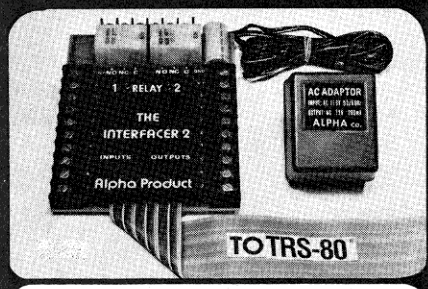


MUSIC-80 MUSIC-80 MUSIC-80 MUSIC-80 MUSIC-80
Use existing software
or write your own. With this low cost 8 bit digital to analog converter you can synthesize up to 5 music voices. Built-in volume control handy when stereo not near TRS-80. Simply plug the "MUSIC-80" into the keyboard or the E/I screen printer port and connect the output (RCA jack) to any amplifier. The Radio-Shack $12 speaker/amplifier works fine.
Fully assembled and tested, 90 day warranty $39.95



YOU ASKED FOR IT: "EXPANDABUS" X1, X2, X3 AND X4.
CONNECT ALL YOUR TRS-80 DEVICES SIMULTANEOUSLY on the 40 pin TRS-80 bus. Any device that normally plugs into the keyboard edge connector will also plug into the "EXPANDABUS". The "X4" is shown with protective covers (included). The TRS-80 keyboard contains the bus drivers (74LS367) for up to 20 devices, more than you will ever need. Using the E/I, it plugs either between KB and E/I or in the Screen Printer port. Professional quality, gold plated contacts. Computer grade 40 conductor ribbon cable.
X2...$29. X3...$44. X4...$59. X5...$74.
Custom configurations are also available, call us.

ANALOG-80: A WORLD OF NEW APPLICATIONS POSSIBLE.
8 DIGITAL MULTIMETERS PLUGGED INTO YOUR TRS-80!!! Measure Temperature, Voltage, Current, Light, Pressure, etc. Very easy to use: for example, let's read input channel #4. 10 OUT 0,4 'Selects input #4 and also starts the conversion 20 A = INP(0) 'Puts the result in variable "A". Voila! Specifications: Input range: 0-5V. to 0-500V. Each channel can be set to a different scale.
Resolution: 20mV (on 5V. range). Accuracy: 8 bits (.5%). Port Address: jumper selectable. Plugs into keyboard bus or E/I (screen printer port). Assembled and tested. 90 day warranty. Complete with power supply, connector, manual ..... $139.



INTERFACER 2: LOW COST INPUT/OUTPUT MODULE.
Still the best value in sense/control devices. Use it for energy control, burglar alarm, darkroom, selectric drive, model trains, robots, Skinner box...
—8 latched TTL outputs, 2 relays SPDT 2A. 125V. contacts
—8 TTL/CMOS inputs. Input 0 and 1 are optically isolated.
—Neat and compact design, very easy to use:
10 A = INP(0) 'Reads the 8 inputs (if A = 0: all inputs are low) 20 OUT 0,X 'Controls the outputs and the relays
Assembled & tested, 90 day warranty. Price includes power supply, cable to KB or E/I, superb user's manual, free phone dialer program: $95. Manual only: $5.

GREEN SCREEN WARNING

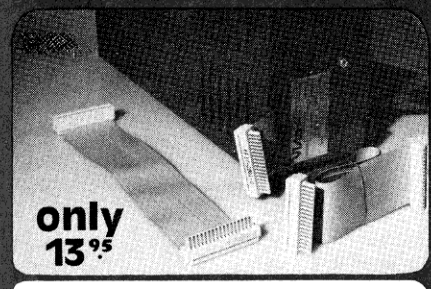
IBM and all the "biggies" are using green screen monitors. Its advantages are now widely advertised. We feel that every TRS-80 user should enjoy the benefits it provides. But **WARNING:** all Green Screens are not created equal. Here is what we found:

- Several are just a flat piece of standard colored Lucite. The green tint was not made for this purpose and is judged by many to be too dark. Increasing the brightness control will result in a fuzzy display.
- Some are simply a piece of thin plastic film taped onto a cardboard frame. The color is satisfactory but the wobbly film gives it a poor appearance.
- One "optical filter" is in fact plain acrylic sheeting.
- False claim: A few pretend to "reduce glare". In fact, their flat and shiny surfaces (both film and Lucite type) ADD their own reflections to the screen.
- A few laughs: One ad claims to "reduce screen contrast". Sorry gentleman but it's just the opposite. One of the Green Screen's major benefits is to increase the contrast between the text and the background.
- Drawbacks: Most are using adhesive strips to fasten their screen to the monitor. This method makes it awkward to remove for necessary periodical cleaning. All (except ours) are flat. Light pens will not work reliably because of the big gap between the screen and the tube.

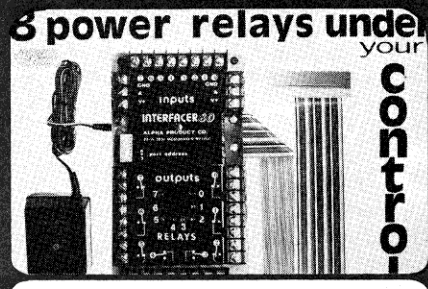
Many companies have been manufacturing video filters for years. We are not the first (some think they are), but we have done our homework and we think we manufacture the best Green Screen. Here is why:

- It fits right onto the picture tube like a skin because it is the only **CURVED** screen **MOLDED** exactly to the picture tube curvature. It is Cut precisely to cover the exposed area of the picture tube. The fit is such that the static electricity is sufficient to keep it in place! We also include some invisible reusable tape for a more secure fastening.
- The filter material that we use is just right, not too dark nor too light. The result is a really eye pleasing display.

We are so sure that you will never take your Green screen off that we offer an unconditional money-back guaranty: try our Green Screen for 14 days. If for any reason you are not delighted with it, return it for a prompt refund.
A last word: We think that companies, like ours, who are selling mainly by mail should: •list their street address •have a phone number (for questions and orders) •accept CODs, not every one likes to send checks to a PO box •offer the convenience of charging their purchase to major credit cards. How come we are the only green screen people doing it?
Order your **ALPHA GREEN SCREEN** today...$12.50



LET THE "CHAIN BREAKER" FREE YOUR MINI-DRIVES.
End the daisy-chain mess once and for all. Fits all mini-drives: Percom, Aerocomp, Shugart, Micropolis, MTI, Vista, Pertec, Siemens, BASF. Easy to install: just remove the drive cover, plug in the "CHAIN BREAKER" and replace the cover. Voila!!!
Now you can change and move your drives around without disassembly. Keep the cover on and keep the dust out. High reliability gold plated contacts, computer grade 34 conductor cable. Tested and guaranteed.
Get one for each drive.....only.....$13.95



INTERFACER-80: the most powerful Sense/Control module.

- 8 industrial grade relays, single pole double throw isolated contacts: 2 Amp. @ 125 Volts. TTL latched outputs are also accessible to drive external solid state relays.
- 8 convenient LEDs constantly display the relay states. Simple "OUT" commands (in basic) control the 8 relays.
- 8 optically-isolated inputs for easy direct interfacing to external switches, photocells, keypads, sensors, etc. Simple "INP" commands read the status of the 8 inputs. Selectable port address. Clean, compact enclosed design. Assembled, tested, 90 day warranty. Price includes power supply, cable, connector, superb user's manual..... $159.

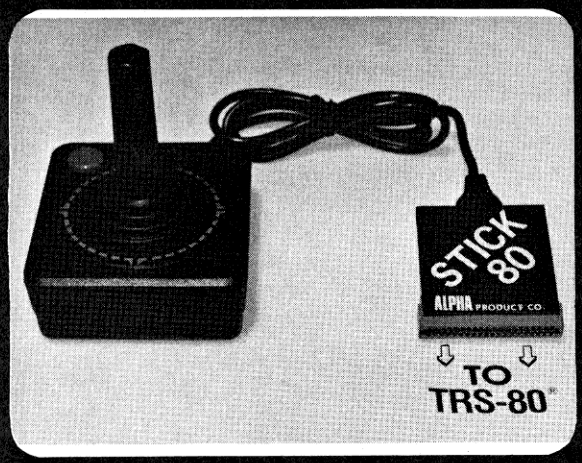
✓210

ALPHA Product Co.

ADD $2.50 PER ORDER FOR SHIPPING AND HANDLING
ALL ORDERS SHIPPED FIRST CLASS MAIL.
WE ACCEPT VISA, MASTER CHARGE, CHECKS, M.O.
COD: ADD $2.00 EXTRA.
QUANTITY DISCOUNTS AVAILABLE.
N.Y. RESIDENTS ADD SALES TAX.

85-71 79 St. WOODHAVEN N.Y. 11421 ☎ Info and order: (212) 296•5916

GAME BREAKTHROUGH:



THE STICK 80

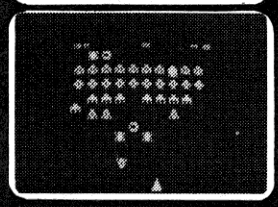
- ☑ FEATURES THE FAMOUS **ATARI JOYSTICK.**
- ☑ WORKS WITH ANY LEVEL 2 AND DISK SYSTEMS.
- ☑ PLUGS DIRECTLY INTO KB. OR E/I (SCREEN PRINTER PORT).
- ☑ INCLUDES SIMPLE, DETAILED INSTRUCTIONS TO MAKE JOYSTICK VERSIONS OF MOST ACTION GAMES.
- ☑ COMPATIBLE WITH **ANY** OTHER TRS-80 ACCESSORIES.
- ☑ FULLY ASSEMBLED AND TESTED. READY TO PLUG IN AND ENJOY.
- ☑ FUN TO EXPERIMENT WITH IN **BASIC:** SIMPLY USE INP(0).
- ☑ 90 DAY PART AND LABOR WARRANTY.

UNCONDITIONAL **MONEY BACK GUARANTEE:** Try your STICK-80 for 14 days. If for any reason you are not delighted with it, return it for a prompt and courteous refund (including shipping and handling). PRICE INCLUDES ATARI JOYSTICK + ALPHA INTERFACE + DETAILED INSTRUCTIONS + DEMO PROGRAM. ONLY $39.95

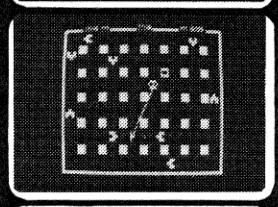
MODEL 3 OWNERS: WE HAVE A **MODEL 3 TO MODEL 1 ADAPTER**

BIG FIVE SOFTWARE SUPER FAST MACHINE LANGUAGE ACTION GAMES

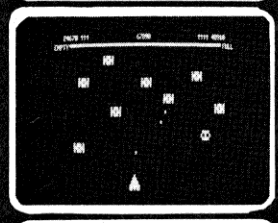
If you and your TRS-80 have longed for a fast-paced arcade-type game that is truly a challenge, then **SUPER NOVA** is what you've been waiting for. In this two player machine-language game, large asteroids float ominously around the screen. Suddenly your ship appears and you must destroy the asteroids before they destroy you! (But watch out because big asteroids break apart into little ones.) The controls that your ship will respond to are thrust, rotate, hyperspace, and fire. All right! You've done it! You've cleared away all the asteroids! But what is that saucer with the laser doing? Quick! You must destroy him fast because that guy's accurate! ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ **SUPER NOVA®**



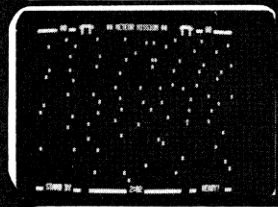
The sound of the klaxon is calling you! Cruel and crafty invaders have been spotted in battle formation warping toward Earth at an incredible speed. Suddenly, your ship materializes just below the huge flock of invaders. Quickly and skillfully you shift right and left as you carefully fire your lasers at them. But watch out! A few are breaking out of the convoy and flying straight at you! As the whine of their engines gets louder, you place your finger on the fire button knowing all too well that this shot must connect—or your mission will be permanently over! With sound effects! ◆◆◆◆◆◆◆◆◆◆◆◆◆ **GALAXY INVASION®**



Your TRS-80 screen has been transformed into a maze-like playfield for this game. As your ship appears on the bottom of the screen, eight alien ramships appear on the top. All of them are traveling at flank speed directly at you! Quickly and boldly you move toward them and fire missiles to destroy them. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the wrath of the keeper of the mazefield: the menacing "Flagship". You must destroy him fast because, as you will find out, that guy's accurate! With sound effects! ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ **ATTACK FORCE®**



With thousands of stars whizzing by you, your **SPACE DESTROYER** ship comes out of hyperspace directly under a convoy of aliens. Almost effortlessly, you skillfully destroy every last one. But before you can congratulate yourself, another set appears. These seem to be slightly more intelligent than the first set. Quickly you eliminate all of them, too. But your fuel supply is rapidly diminishing. You must still destroy two more sets before you can dock with your space station. All right! The space station is now on your scanners! Oh no! Intruders have overtaken the station! You must skillfully fire your neutron lasers to eliminate the intruders from the station before your engines run out of fuel and explode! With sound! ◆◆◆◆◆◆◆◆◆◆◆◆◆◆ **COSMIC FIGHTER®**



The second **Big Bang** has occurred and the galaxy is full of stray asteroids and meteors. As you look through your space port you see a belt of asteroids drifting across the screen blocking your path to the safety of the space station above. But be careful because meteor showers, exploding suns and invading aliens may strike your ship and send it hurtling back to ground level. How many times can you and your opponent maneuver through those obstacles before time runs out? With sound effects! ◆◆◆◆◆ **METEOR MISSION II®**

SPECIAL

INTRODUCTORY OFFER:

Order the STICK-80 with one or more games and choose one:

•FREE ALPHA GREEN SCREEN
OR
•FREE MAGIC ARTIST PROGRAM

IN ADDITION YOU MAY:
ORDER 2 GAMES AND TAKE 10% OFF
ORDER 3 GAMES AND TAKE 15% OFF

All games are written in machine language and supplied on cassette.

EACH GAME IS AVAILABLE IN 2 VERSIONS

A SIDE 1: LEVEL II 16K FOR MODEL 1
SIDE 2: LEVEL II 16K FOR MODEL 3 $15.95

B SIDE 1: DISK 32K FOR MODEL 1
SIDE 2: LEVEL II 16K FOR MODEL 1
THE DISK VERSION SAVES THE HIGH SCORES ON DISK $17.95

* ALL THESE NEW JOYSTICK GAMES WILL ALSO WORK USING THE KEYBOARD WITHOUT ANY MODIFICATIONS.

GOOD NEWS: If you already have a non-joystick version of these BIG FIVE SOFTWARE games, send the original tape(s) with your STICK-80 order + $3 per game. We will send you a new Joystick version of your game(s).

ALSO AVAILABLE **DOUBLE-STICK 80:** 2 ATARI JOYSTICKS + ALPHA DUAL INTERFACE + INSTRUCTIONS + DEMO PROGRAM: $59.95

ALPHA Product Co.

✓262

ADD $2.50 PER ORDER FOR SHIPPING AND HANDLING
ALL ORDERS SHIPPED FIRST CLASS MAIL.
WE ACCEPT VISA, MASTER CHARGE, CHECKS, M.O.
COD: ADD $2.00 EXTRA
QUANTITY DISCOUNTS AVAILABLE
N.Y. RESIDENTS ADD SALES TAX.

85-71 79 St. WOODHAVEN N.Y. 11421 phone: (212) 296 5916

Announcing "Hellfire Warrior", a fantastic new Dunjonquest™ computer game... that's really not for everybody: Beginners are likely to be gobbled up in the first room...and there are over 200 rooms on four levels

"Hellfire Warrior." Really not for everybody: newcomers to Dunjonquest should begin with something easier. Here the monsters are deadlier, the labyrinths more difficult, the levels far more challenging...

But for the experienced Dunjonquest game player there are more command options, more potions (131), more magical items (including—at last—magical armor), more special effects, more surprises. And an innkeeper, an armorer, apothecary and magic shops.

In part a sequel to The Temple of Apshai, up until now the greatest of all the Dunjonquest games, Hellfire Warrior can also be played completely on its own.

Now the character you've created, representing the highest level of role-playing to date, can explore the four new lower levels:

Level 5—"The Lower Reaches of Apshai." With the giant insects and other nasties that swarmed through the upper levels of Apshai. With rooms your hero can get into, but not out of.

Level 6—"The Labyrinth." The only exit is hidden within the Labyrinth. And man-eating monsters can thwart your hero.

Level 7—"The Vault of the Dead."...And of the undead—skeletons, ghouls, mummies, specters... invisible ghosts—lurking in the rooms, doors, secret passages, ready to reduce your hero to a pale shadow of himself. Permanently.

Level 8—"The plains of Hell." In an Underworld of lost souls and shades of dead, of dragons and fiery hounds, of bottomless pits and blasts of hellfire, our hero must rescue the beautiful warrior maiden lying in enchanted sleep within a wall of fire. And bring her past unbelievable dangers and monsters... even Death itself...to sun and air and life itself.

Hellfire Warrior. The most exciting game yet from Automated Simulations, the leading producer of computer fantasy games.

Guaranteed: If it's not the most exciting computer game you've played, return it within ten days for a complete refund.

Available on disk for the Apple II and Radio Shack's TRS80, or on cassette for the TRS80 and for the Commodore PET. **The cassette or disk: $39.95.** Boxed with a magnificent instruction manual. Some of the drawings in the manual are reproduced here (in greatly reduced scale).

Hellfire Warrior. From the people who design and make some of the very, very best computer games, games that thinkers play. Including the great role-playing Dunjonquest series—The Temple of Apshai, Datestones of Ryn, Morloc's Tower, and now Hellfire Warrior. And Invasion Orion and Starfleet Orion. And more.

Hellfire Warrior. Like every EPYX computer game from Automated Simulations, it has the unique EPYX triple no-questions-asked warranty.

Hellfire Warrior. Now available on disk or cassette for TRS80, the Apple and the PET. At better computer stores everywhere. If you can't find it at your local friendly dealer, insist he order it for you.

Or you may order directly from Automated Simulations. **If you want to use your MasterCard or VISA, use our toll-free phones:** In the United States: operator 861 **(800) 824-7888;** In California: operator 861 **(800) 852-7777;** In Hawaii and Alaska: operator 861 **(800) 824-7919.** We'll also send you our new catalogue, hot off the press.

Or write Department F2, P.O. Box 4247, 1988 Leghorn St., Mountain View, CA 94040.

✓48

Please specify if you wish the **Disk** for TRS80 (32K, TRSDOS) and Apple (48K with Applesoft in ROM or the **Cassette** for the TRS80 (16K, Level II) or the Commodore PET (32K, old or new ROMs). Only $39.95, disk or cassette.

COMPUTER GAMES THINKERS PLAY EPYX

TRIPLE WARRANTY

10 DAY FULL MONEY BACK GUARANTEE: If you don't like the game for any reason whatever, return it intact within 10 days of receipt for a complete refund. No questions asked.

30 DAY DEFECTIVE WARRANTY: Cassette or disk not functioning within 30 days of receipt; return it for exchange. No charge, of course.

FOREVER—LIMITED LIFETIME WARRANTY: No matter what happens to your cassette or disk; the dog chewed it...you left it out in the rain...whatever. No matter **when** it happens. Return the remains to us (with $5.00 to cover all handling and shipping) and we'll send you a brand new cassette or disk.

The Wizard is a program that really doesn't deserve to be called a game because it can also be educational. The real power behind The Wizard is the utility that comes with it allowing you to program in your own questions and answers on any subject you want.

This utility, I might add, is very easy to use. I have used it to program subjects on science and history. It is only limited by your imagination. A possible future addition might be separate category modules that would include questions and answers on a variety of different subjects.

There is one thing about The Wizard that could use improvement. The program takes a noticeably long time to load.

In closing I think the Wizard would be a compliment to any program library and is well worth the asking price. ■

Deluxe Personal Finance
Small Business Systems Group
Westford, MA
$39.95

by Reese Fowler

The Deluxe Personal Finance is an extensive budget program to be used in an individual household. The system is in the form of a mini-general ledger and includes an accounts payable program.

Using the system you can:

- Record 900 check transactions annually.
- Allow nine budget categories per check.
- Maintain an accurate checking account balance.
- Provide summaries of income vs. spending by month.
- Estimate and average monthly expenses.
- Assign expenses to 28 different categories.
- Assign income to three different categories.
- Generate end of year reports for tax purposes.

The package also includes an extensive manual that explains how to use the program. The manual also provides information on how to change the program to meet your specific needs.

The program runs on two disk drives, TRS-80 Model I with 32K of memory.

There are eight modules to the program that are called from a master menu. The data is written for a separate data disk that is inserted only when a request for data is made. This requires changing disks, consequently a second drive helps to expedite the process.

One criticism I have of the program has nothing to do with its operation. The program maintains a good set of records, but only if they are utilized. Often, there is a tendancy in a budget program to use it for awhile and then to stop.

However, if you do use Deluxe Personal Finance, all the data you need at income tax time will be right at your fingertips. ■

Quill Driver: A Text Formatting Program
The Alternate Source
Lansing, MI
Model I 32K
Model II 64K
$39.95 disk

by Dennis Thurlow

A Quill Driver is not a word processor: it is a text formatter. This information, and its ramifications, are not explicitly layed out in its documentation and this may lead you to believe it is actually a word processor. After the table of contents, introduction, and preface, there is one line in the overview stating that text files are prepared using the BASIC editor, EDTASM, or any program that creates unnumbered files of text.

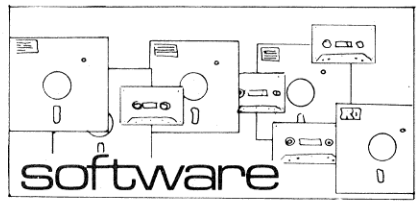
Back to Front

Chapter 2 briefly touches on this fact again, but you will find no examples or discussion of what form the files must have until you reach Appendix B.

I spent two frustrating hours reading through the manual, waiting to find some reference to input. When I reached the end, it occurred to me that the manual would make much more sense read back to front. Accordingly, this review will cover the manual—from back to front.

First we find the registration form. I suggest you send this in because I did find one bug in the system and there's no way they can inform you of the fix unless they know who you are.

Next is Appendix D, which tells us about a machine language driver that debounces the keyboard; keeps LPRINT from hanging up your machine; LPRINTs compression codes as proper tabs; gives you a repeat key function; allows several lowercase options; and sends line feeds and control characters when and where they are appropriate. Loading and use of the driver on a variety of systems is very clearly explained.



Dawning of the Light

Appendix C explains how to patch different versions of EDTASM to accept lowercase input. Why would you want to patch EDTASM? The light suddenly dawns! You can use EDTASM to make text files!

Appendix B shows the format for those files using two clear examples that also demonstrate most of the available printing features. On my disk, the EDTASM files differed slightly from the example, but this didn't cause any problems.

In Appendix B you learn how to imbed the codes to the formatter. Appendix A lists the codes, gives a brief description of each function, and the location of a complete description found in the text of the manual.

The last chapter contains the operating instructions for the program. It is easy to deduce from the operating instructions that text prepared with the BASIC editor can be used, as can files written to disk with no line numbers.

The program, which is written in BASIC, performs all the standard word processing functions when printing, is amazingly versatile and works perfectly with files prepared in the methods described in Appendix A and B. It had some trouble keeping track of the .AL counters in EDTASM prepared text. Normally, the .AL code allows you to switch back and forth between two files of text opened simultaneously. This is great for typing form letters while adding a different heading or personalized comments on each.

Once you figure out how to use the Quill Driver you will be delighted at how well it works, but please, sdrawkcab noitatnemucod eht daer! ■

"The program, which is written in BASIC, performs all the standard word processing functions when printing. . ."

THE ASSEMBLY LINE

by William Barden, Jr.

". . . if the machine language output is relocatable, it can be embedded in BASIC. . . in dummy strings, arrays and other formats."

In assembly language as in real estate, it's sometimes better to remain where you are and not move around. Sure, I know that Zilog literature touts the Z-80 as producing relocatable code with the JR and DJNZ instructions—but how hard is it to make *all* code relocatable? About as easy as it is to sell your "3 BR, FDR, view, near Radio Shack store" home with the sagging rain gutters and cutworm-ridden dichondra. . .

You know what's coming next: I'm going to gripe and moan about how hard it is to use the Z-80 for relocatable code! If you can tolerate the lamentations, we'll look at code which will provide 50 percent more disk or memory capacity for text data, to illustrate the problems of relocatability. We'll also review some books and, for you puzzle buffs, we'll have the Fourth Great Assembly Line Programming Contest.

Why Relocatable Code?

There are many reasons assembly language code should be relocatable. The first to come to mind has been discussed many times in this column—if the machine language output is relocatable, it can be embedded in BASIC programs in the form of dummy strings, arrays, and other formats. This way machine code can be part of the BASIC program and loaded as one module.

A second reason for relocatable code is to make the object module free to move anywhere in memory without having to reassemble. Most of us have had cassette versions of programs that were not usable in DOS because they overlaid portions of the DOS. Finding the starting and ending addresses of the program is easy enough, but how to relocate the code to higher memory so it could be stored and read from disk is a stumper. In most cases the source code is proprietary. Fully relocatable code would avoid this problem.

Another reason: With a number of relocatable object modules in a library, it would be a simple matter to use them together to create a larger applications program without having to worry about reassembling. The disk Editor/Assembler will automatically relocate object code to any area of memory, but why not work directly with a module instead of a sophisticated loader? It might even be possible to emulate the actions of a large system by allocating memory dynamically for a number of separate tasks. The tasks could be moved without having to adjust the code for relocation; possibly even some multiprogramming could be done—running several programs concurrently in memory.

"In assembly language as in real estate, it's sometimes better. . . not to move around."

A Base 40 Converter

According to Zilog literature, it's a relatively simply matter to spew out relocatable code. Let's take a look at a typical program and see what's involved in making it completely relocatable. The program I chose to write for this exercise is a Base 40 converter.

The Base 40 converter has been around for a long time. The idea is this: If we work with a subset of 40 characters—the letters A through Z, the digits 0 through 9, and four special characters—it's possible to compress what would be three ASCII bytes into two bytes! This means we could increase our diskette or memory capacity by 50 percent as long as we are willing to use only the 40 characters.

Why 40 characters? If each character is assigned a code 0—39, a 16-bit register pair or pair of memory locations can hold three digits of a base 40 number. If codes 0—9 represent the digits 0—9, codes 10—35 represent the letters A—Z, and codes 36, 37, 38, and 39 represent four special characters, the base 40 number 29, 27, 28 would represent "TRS". The base 40 form would be 29*48**2 + 27*40**1 + 28*40**0, where * represents the multiplication operator and ** represents exponentiation. This is the same as 29*1600 + 27*40 +27*1 = 47507, which can be held in 16 bits.

The largest number would be 39*1600 + 39*40 + 39*1, or 63,999, which could be held in 16 bits with no problem. To answer your next question—no, base 41 would have a maximum value of 68,920, too large for 16 bits!

The program is shown in Listing 1. It consists of two parts, Encode, that converts three ASCII characters into a two-byte base 40 number, and Decode, that reconverts a two-byte base 40 number into three ASCII characters.

Enter Encode from BASIC with the usual Level II, Level III, or Disk BASIC call. The CALL 0A7FH puts the argument into HL. The argument points to the three characters to be converted. On return, the two-byte result is put into the first and second bytes. If any of the characters is not one of the 40 characters, a zero is used as the code.

Entry to Decode is made with the argument pointing to the two bytes of a base 40 number. On return, the three character result is put into the first, second, and third bytes of the string.

Listing 2 shows a test of Encode/Decode from Disk BASIC. An input string of three characters is converted to two bytes, the two bytes are displayed, the two bytes are reconverted, and the result is again displayed. USR0 is for Encode and USR1 is for Decode.

Program Listing 1 is not relocatable. If it were moved from the 7F00H area to BF00H, for example, it would bomb. The CALL OA7FH is relocatable. It would remain the same, as a call must always be made to pick up the argument from the BASIC interpreter. Everything else is relocatable down to CALL XLATE, which involves an address within the Encode/Decode code, and must be changed if the program is relocated.

Continuing down the listing, we find no more non-relocatable CALLs or JPs; the

JRs are always relocatable, as they are referenced to the contents of the program counter which changes according to the instruction being executed. The displacement in the second byte of the JR is fixed, no matter where the Encode/Decode set of code is moved.

There are four other non-relocatable instructions: The three LD IX instructions that pick up TABLE – 1 or TABLE + 39 and the LD DM TABLE are not relocatable. The immediate address in bytes one and two of these instructions change based on where TABLE is located in memory. In all, one CALL and four immediate LDs must be made relocatable before Encode/Decode can be moved.

Possible Relocation Schemes

Look at the crib sheet of the Z-80 instructions. There is *no* way to read the contents of the program counter that doesn't involve a relocatable instruction! There are some other approaches, however, that might be used.

We could have the calling routine pass us the base argument of Encode. If this code is in a dummy string or array, presumably we could always find the address in BASIC by a VARPTR. This address could be passed as a parameter to the routine itself. If the routine were at A$, for example, the following code would pass the base address to the routine:

```
100 B = VARPTR(A$)
110  B = PEEK(B + 1) + PEEK(B + 2)*256:IF  B>32767
THEN B = B – 65536
120 DEFUSR0 = B
130 A = USR0(B)
```

Another way we could pass the base address to the routine is by executing a CALL to some fixed location in memory. If the CALL address were permanently at FF00H, CALL 0FF00H would be relocatable. The code at FF00H could then get the return address from the top of the stack and return it in a register pair. Something like this would suffice:

```
POP   HL
JP   (HL)
```

This code puts the return address into HL from the top of the stack, then jumps to the return address using HL. The return address in HL is not destroyed in the return, as it is in RET. If we have the address of the instruction following CALL 0FF00H, we can easily compute any address in the program block.

The two instruction sequence above is in ROM at location 0BH. As ROM never changes, 133 revisions notwithstanding, we can use the POP HL, JP (HL) as a "where am I" function from any assembly language program.

Adding Bias to a Base Address

Calling location 0BH in ROM returns the address of the instruction following the call in HL. Knowing that address, it is easy to find the address of any location forward or backward from the address. The scheme that can be used for CALLs is to add a bias to the base address to compute the address of the return point, PUSH that return point, and then to JR to the

Listing 1. Encode/Decode

```
7F00            00100          ORG     7F00H
                00110 ;*****************************************************
                00120 ;*  BASE 40 ENCODING/DECODING PROGRAM.               *
                00130 ;*     ENTER AT ENCODE FOR ENCODING:                 *
                00140 ;*       ENTRY: HL=> 3 ASCII BYTES FOR ENCODING      *
                00150 ;*       EXIT:  HL DESTROYED. 2 ENCODED BYTES IN BUFFER *
                00160 ;*     ENTER AT DECODE FOR DECODING                  *
                00170 ;*       ENTRY: HL=> 2 ENCODED BYTES FOR DECODING    *
                00180 ;*       EXIT:  HL DESTROYED. 3 ASCII BYTES IN BUFFER *
                00190 ;*****************************************************
7F00 CD7F0A     00200 ENCODE   CALL    0A7FH          ;GET BUFFER LOCATION
7F03 E5         00210          PUSH    HL             ;TRANSFER TO IY
7F04 FDE1       00220          POP     IY
7F06 210000     00230          LD      HL,0           ;CLEAR ENCODE RESULT
7F09 0603       00240          LD      B,3            ;SETUP LOOP COUNT
7F0B 29         00250 ENC010   ADD     HL,HL            ;*2
7F0C 29         00260          ADD     HL,HL            ;*4
7F0D 29         00270          ADD     HL,HL            ;*8
7F0E E5         00280          PUSH    HL               ;SAVE
7F0F 29         00290          ADD     HL,HL            ;*16
7F10 29         00300          ADD     HL,HL            ;*32
7F11 D1         00310          POP     DE               ;RESTORE *8
7F12 19         00320          ADD     HL,DE            ;*40
7F13 FD7E00     00330          LD      A,(IY)           ;GET ASCII BYTE
7F16 CD667F     00340          CALL    XLATE            ;CONVERT TO 0-39 CODE
7F19 FD23       00350          INC     IY               ;BUMP BUFFER PNTR
7F1B 19         00360          ADD     HL,DE            ;MERGE CODE
7F1C 10ED       00370          DJNZ    ENC010           ;GO THREE TIMES
7F1E FD75FD     00380          LD      (IY-3),L       ;SAVE LSB
7F21 FD74FE     00390          LD      (IY-2),H       ;SAVE MSB
7F24 C9         00400          RET                    ;RETURN TO CALLING PROG
7F25 CD7F0A     00410 DECODE   CALL    0A7FH          ;GET BUFFER LOCATION
7F28 E5         00420          PUSH    HL             ;TRANSFER TO IY
7F29 FDE1       00430          POP     IY
7F2B 0603       00440          LD      B,3            ;SETUP LOOP COUNT
7F2D FD6E00     00450          LD      L,(IY)         ;GET LSB
7F30 FD6601     00460          LD      H,(IY+1)       ;GET MSB
7F33 DD217A7F   00470          LD      IX,TABLE-1     ;TABLE START TO IX
7F37 114006     00480          LD      DE,1600        ;40**2
7F3A B7         00490 DEC010   OR      A                ;CLEAR CARRY
7F3B ED52       00500          SBC     HL,DE            ;SUBTRACT TIL NEGATIVE
7F3D DD23       00510          INC     IX               ;BUMP TABLE PNTR
7F3F 30F9       00520          JR      NC,DEC010        ;GO IF NOT NEGATIVE
7F41 19         00530          ADD     HL,DE          ;RESTORE RESIDUE
7F42 DD7E00     00540          LD      A,(IX)         ;CONVERT TO ASCII
7F45 FD7700     00550          LD      (IY),A         ;PUT IN BUFFER
7F48 112800     00560          LD      DE,40          ;40**1
7F4B DD217A7F   00570          LD      IX,TABLE-1     ;TABLE START TO IX
7F4F B7         00580 DEC030   OR      A                ;CLEAR CARRY
7F50 ED52       00590          SBC     HL,DE            ;SUBTRACT TIL NEGATIVE
7F52 DD23       00600          INC     IX               ;BUMP TABLE PNTR
7F54 30F9       00610          JR      NC,DEC030        ;GO IF NOT NEGATIVE
7F56 19         00620          ADD     HL,DE            ;RESTORE RESIDUE
7F57 DD7E00     00630          LD      A,(IX)           ;CONVERT TO ASCII
7F5A FD7701     00640          LD      (IY+1),A         ;PUT IN BUFFER
7F5D 117B7F     00650          LD      DE,TABLE       ;TABLE START TO DE
7F60 19         00660          ADD     HL,DE          ;POINT TO CHAR
7F61 7E         00670          LD      A,(HL)         ;GET LAST CHAR
7F62 FD7702     00680          LD      (IY+2),A       ;SAVE IN BUFFER
7F65 C9         00690          RET                    ;RETURN TO CALLING PROG
7F66 DD21A27F   00700 XLATE    LD      IX,TABLE+39    ;TABLE START+39
7F6A 1E28       00710          LD      E,40           ;# OF BYTES IN TABLE
7F6C DDBE00     00720 XLA010   CP      (IX)             ;COMPARE A TO TABLE ENTRY
7F6F 2806       00730          JR      Z,XLA020         ;GO IF MATCH
7F71 DD2B       00740          DEC     IX               ;BUMP TABLE PNTR
7F73 1D         00750          DEC     E                ;DECREMENT COUNT
7F74 20F6       00760          JR      NZ,XLA010        ;GO IF MORE
7F76 1C         00770          INC     E              ;ADJUST POINTER
7F77 1D         00780 XLA020   DEC     E              ;ADJUST INDEX
7F78 1600       00790          LD      D,0            ;INDEX NOW IN DE
7F7A C9         00800          RET                    ;RETURN
7F7B 30         00810 TABLE    DEFM    '0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ;,()'
     31 32 33 34 35 36 37 38
     39 41 42 43 44 45 46 47
     48 49 4A 4B 4C 4D 4E 4F
     50 51 52 53 54 55 56 57
     58 59 5A 3B 2C 28 29
0000            00820          END
00000 TOTAL ERRORS
```

Listing 2. Encode/Decode Exerciser

```
100 DEFUSR0=&H7F00:DEFUSR1=&H7F25
110 INPUT A$
120 B=VARPTR(A$):C=PEEK(B+1)+PEEK(B+2)*256:IF C>32767 T
     HEN C=C-65536
130 A=USR0(C)
140 PRINT PEEK(C),PEEK(C+1)
150 A=USR1(C)
160 PRINT A$
170 GOTO 110
```

Listing 3. Relocation Version

```
7F00            00100          ORG     7F00H
                00110 ;*****************************************************
                00120 ;*  BASE 40 ENCODING/DECODING PROGRAM.                *
                00130 ;*    ENTER AT ENCODE FOR ENCODING:                   *
                00140 ;*      ENTRY: HL=> 3 ASCII BYTES FOR ENCODING        *
                00150 ;*      EXIT:  HL DESTROYED. 2 ENCODED BYTES IN BUFFER *
                00160 ;*    ENTER AT DECODE FOR DECODING                    *
                00170 ;*      ENTRY: HL=> 2 ENCODED BYTES FOR DECODING      *
                00180 ;*      EXIT:  HL DESTROYED. 3 ASCII BYTES IN BUFFER  *
                00190 ;*****************************************************
7F00 CD7F0A     00200 ENCODE   CALL    0A7FH          ;GET BUFFER LOCATION
7F03 E5         00210          PUSH    HL             ;TRANSFER TO IY
7F04 FDE1       00220          POP     IY
7F06 210000     00230          LD      HL,0           ;CLEAR ENCODE RESULT
7F09 0603       00240          LD      B,3            ;SETUP LOOP COUNT
7F0B 29         00250 ENC010   ADD     HL,HL            ;*2
7F0C 29         00260          ADD     HL,HL            ;*4
7F0D 29         00270          ADD     HL,HL            ;*8
7F0E E5         00280          PUSH    HL               ;SAVE
7F0F 29         00290          ADD     HL,HL            ;*16
7F10 29         00300          ADD     HL,HL            ;*32
7F11 D1         00310          POP     DE               ;RESTORE *8
7F12 19         00320          ADD     HL,DE            ;*40
7F13 FD7E00     00330          LD      A,(IY)           ;GET ASCII BYTE
7F16 E5         00340          PUSH    HL               ;SAVE RESULT
7F17 CD0B00     00350          CALL    0BH              ;GET ADDRESS
7F1A 110700     00360 ENC020   LD      DE,BIAS1         ;DISPLACEMENT
7F1D 19         00370          ADD     HL,DE            ;COMPUTE ADDRESS OF XLATE
7F1E E5         00380          PUSH    HL               ;SAVE RETURN
7F1F 1855       00390          JR      XLATE            ;CALL XLATE
7F21 E1         00400 ENC030   POP     HL               ;RESTORE RESULT
7F22 FD23       00410          INC     IY               ;BUMP BUFFER PNTR
7F24 19         00420          ADD     HL,DE            ;MERGE CODE
7F25 10E4       00430          DJNZ    ENC010           ;GO THREE TIMES
7F27 FD75FD     00440          LD      (IY-3),L       ;SAVE LSB
7F2A FD74FE     00450          LD      (IY-2),H       ;SAVE MSB
7F2D C9         00460          RET                    ;RETURN TO CALLING PROG
7F2E CD0B00     00470 DECODE   CALL    0BH            ;GET ADDRESS
7F31 115F00     00480          LD      DE,BIAS2       ;DISPLACEMENT
7F34 19         00490          ADD     HL,DE          ;COMPUTE TABLE START
7F35 E5         00500          PUSH    HL             ;SAVE
7F36 CD7F0A     00510          CALL    0A7FH          ;GET BUFFER LOCATION
7F39 E5         00520          PUSH    HL             ;TRANSFER TO IY
7F3A FDE1       00530          POP     IY
7F3C 0603       00540          LD      B,3            ;SETUP LOOP COUNT
7F3E FD6E00     00550          LD      L,(IY)         ;GET LSB
7F41 FD6601     00560          LD      H,(IY+1)       ;GET MSB
```

Program continues

subroutine. This sequence is shown in Listing 3, lines 350—390. CALL 0BH returns the address of ENC020 in HL. DE is loaded with BIAS1 which is equal to ENC030-ENC020, the difference between the base address and the return point. This address is PUSHed onto the stack, and a JR is done to XLATE.

The same scheme could be used for JPs, but it's much simpler to use a JR in place of the JP. If the jump is beyond the range of the JR (– 126 to + 129 bytes), use a linking JR within the range.

Listing 3 also shows the bias scheme for LDs of addresses at lines 470—500. In this case we want to find the address of TABLE – 1. CALLing 0BH returns the address on the next instruction after Decode. Adding BIAS2 results in DECODE + 3 + TABLE – 1 – DECODE – 3 = TABLE – 1. This is PUSHed into the stack for future reference. A similar scheme is used at XLATE to compute the address of TABLE + 39.

Listing 3 is fully relocatable even though it is arbitrarily assembled at 7F00H (see Listing 4). It moves the code upward one byte so that the program starts at 7F01H, and then repeats the sequence.

You may wish to investigate other schemes to make all code relocatable. There is a great deal of work involved in calculating the CALL and immediate addresses; whether or not it's worth it depend on your application. An interesting sidenote—the Color Computer 6809 microprocessor easily produces fully relocatable code. You might take a look at its structure to see the methods it uses to reference the program counter.

The Comments Didn't Come Out . . .

I have rarely seen a computer manufac-

Features of the FATIGUE FIGHTER T.M.:

- REDUCES OPERATOR FATIGUE THEREBY ALLOWING MORE EFFICIENT USE OF THE COMPUTER.
- INSTALLS EASILY WITH PRESSURE SENSITIVE ADHESIVE. NO SCREWS, CLIPS, OR DRILLING TO DAMAGE MONITOR.
- DESIGNED TO MATCH TRS-80® STYLING FROM THE BLACK AND SILVER BORDER TO THE LETTERING TYPE FACE.
- MADE OF TOUGH 1/8 INCH THICK ACRYLIC SHEET FOR DURABILITY, EASE OF CLEANING, AND A QUALITY APPEARANCE.
- FITS BOTH THE MODEL I AND THE MODEL II.
- DOES NOT VOID THE COMPUTER WARRANTY.

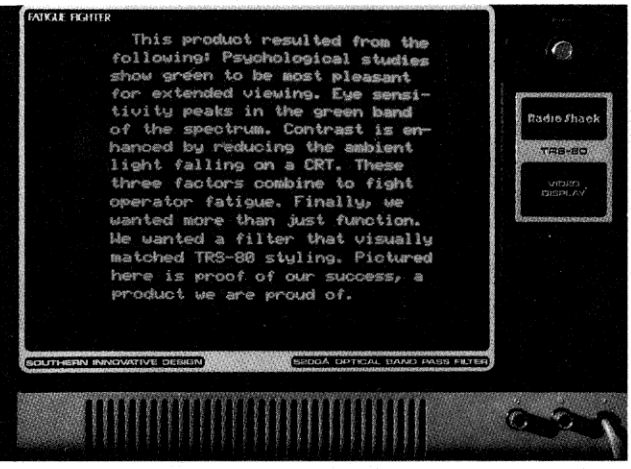
TO ORDER:

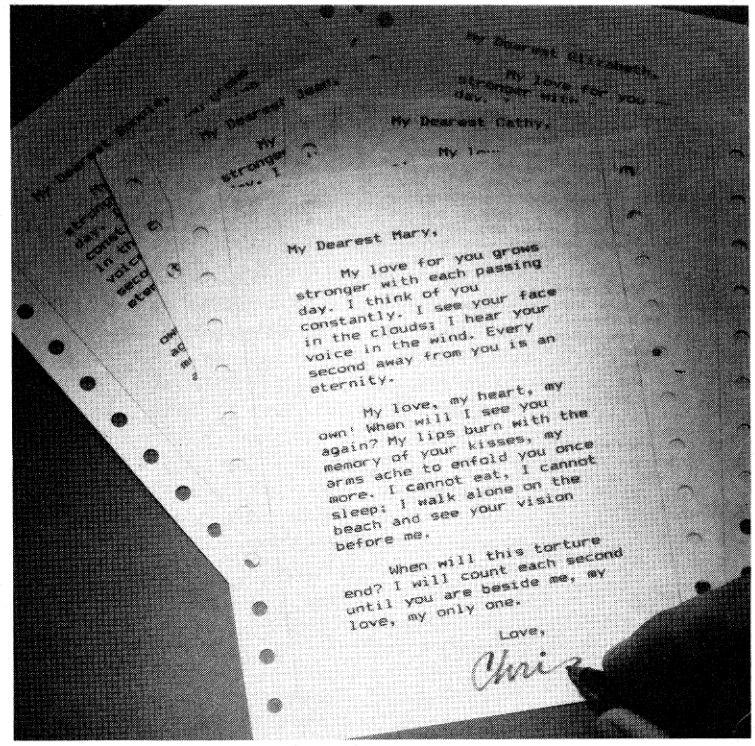
Send Name & Address Typed or Clearly Printed with Check or Money Order for $12.95 Each, Including Shipping. COD's are $2.50 Additional Per Order & are Accepted by Mail or by Calling 904-378-2494 9-5 M-F. Florida Residents Add 4% Sales Tax.

TRS-80 IS A TRADEMARK OF TANDY

SID

SOUTHERN INNOVATIVE DESIGN
1520 NORTHEAST 12TH STREET
GAINESVILLE, FLORIDA 32601 ✓373





We're known for our fine print.

Epson.

The type you get out of most printers you wouldn't send to your maiden aunt, much less use for your *important* correspondence. And up to now, in order to get a dot matrix hardcopy you could really call correspondence quality, you had to spend on the high side of a thousand bucks.

Not any more.

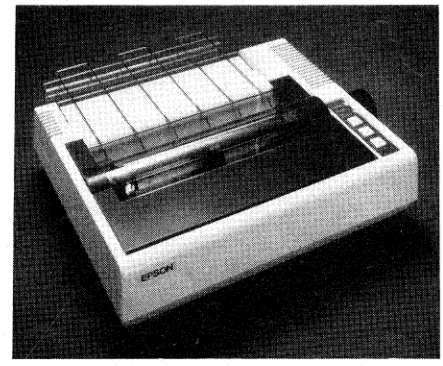
The Epson MX-80 challenges any dot matrix printer anywhere to match our type at our price. Or even come close.

Our emphasized print mode gives you a tack-sharp, clean, easy-to-read face with true descenders—at a fraction of the price of daisy wheel printers. We give you a user-defined choice of twelve different weights and sizes of letters in 40, 80, 66 or 132 columns. We give you adjustable tractors so you can do anything from labels to memos to manuscripts. Fast and clean.

But if you think print quality is the only thing we have to sell, you're wrong. The MX-80 may be the most revolutionary printer to come out in the past ten years.

For starters, it features the world's first *disposable* print head—after it's printed between 50 and 100-million characters, just throw it away. A new one costs less than $30 and you can change it yourself with one hand. Plus, the MX-80 prints bidirectionally and 80 CPS with a logical seeking function to minimize print head travel time and maximize throughput. Finally—and this is the best part—you can buy an MX-80 right now for less than $650.

And that's what we call a lot of fine print for the money.



EPSON

EPSON AMERICA, INC.

23844 Hawthorne Boulevard • Torrance, CA 90505 • (213) 378-2220 ✓404

✓See List of Advertisers on page 306

turer that released the source listings of an assembler or compiler. So what do you do when there are bugs in the utility software? You scrounge around in the code and correct the bugs and add the necessary patches.

There is a similar situation with software. Should a software house that has invested a huge chunk of time in software development release source listings? It's very frustrating to users not to have the source for specialized patches.

At this point the question appears to be academic. There is at least one book available providing a fully commented source listing of Level II ROM, and a series that goes a long ways towards explaining the internal workings.

The book is *Microsoft BASIC Decoded and Other Mysteries* by James Farvour (IJG Computer Services). It is a 310-page book that takes an Apparat disassembly and comments every line. You supply the operands of the instruction; everything else is printed. You will have to disassemble the code and put the pages of the disassembly alongside the comments, a formidable but worthwhile task. Every line is commented, with some expanded comments appearing on the back of the page. In addition to the disassembly, there are 61 pages of general text about ROM calls, the structure of ROM, variables, and disk operation.

The book is accurate, more so than any other book written about ROM thus far, with the exception of the next book I'm going to mention.

Farvour's book is rather steep, at $29.95. It is a fully annotated source listing of ROM, but don't expect to get a tutorial on the internal workings of the BASIC interpreter. It's not a workbook on designing BASIC interpreters, although it certainly eliminates a lot of research.

The Book, Volume I, by Insiders Software Consultants covers math operations in ROM. It is the first of three books describing Level II ROM. *The Book* is approximately 136 pages long, about 75 percent ROM disassembly.

If you would like a detailed, accurate description of all types of BASIC math operations (particularly floating-point operations) together with ROM calls and examples, this is the book for you. I would definitely recommend *The Book* at $14.95 for these subjects.

I'm often asked what assembly language books I would recommend. One that I would highly recommend, but with some warning, is *Practical Microcomputer Programming: The Z80* by Walter J. Weller, Northern Technology Books. First the bad news: The book does not use standard mnemonics. If you can get past the shock of using BZ ZILCH instead of JP NZ, ZILCH, the material in it is well-written and interesting. The book contains a listing of a complete Z-80 assembler, and is not inexpensive at $32.95.

One of these days my book *More TRS-80 Assembly Language Programming* will emerge from the depths of Radio Shack. It covers the Disk Assembler and other intermediate assembly language topics.

The Fourth Great Assembly Line Programming Contest

All right—you asked for it. Here's the fourth Assembly Line Programming Contest. In honor of the 8080 precursor of the Z-80, there are eight questions. Answer them briefly, send the results to me, and you may be mentioned in a computer magazine column as well as receiving a trivial prize. We'll have two winners, a novice class winner (less than 100 hours of assembly language experience) and a hacker winner (more than 100 hours). Send your entries to the address at the end of this column no later than the 20th of the month and be sure to specify what kind of fool you are.

Number One: What is the tightest timing loop that can be written for counts of

```
7F44 DDE1      00570          POP     IX              ;GET TABLE START-1
7F46 DDE5      00580          PUSH    IX              ;SAVE TABLE START-1
7F48 114006    00590          LD      DE,1600         ;40**2
7F4B B7        00600 DEC010   OR      A                 ;CLEAR CARRY
7F4C ED52      00610          SBC     HL,DE             ;SUBTRACT TIL NEGATIVE
7F4E DD23      00620          INC     IX                ;BUMP TABLE PNTR
7F50 30F9      00630          JR      NC,DEC010         ;GO IF NOT NEGATIVE
7F52 19        00640          ADD     HL,DE           ;RESTORE RESIDUE
7F53 DD7E00    00650          LD      A,(IX)          ;CONVERT TO ASCII
7F56 FD7700    00660          LD      (IY),A          ;PUT IN BUFFER
7F59 112800    00670          LD      DE,40           ;40**1
7F5C DDE1      00680          POP     IX              ;GET TABLE START-1
7F5E DDE5      00690          PUSH    IX
7F60 B7        00700 DEC030   OR      A                 ;CLEAR CARRY
7F61 ED52      00710          SBC     HL,DE             ;SUBTRACT TIL NEGATIVE
7F63 DD23      00720          INC     IX                ;BUMP TABLE PNTR
7F65 30F9      00730          JR      NC,DEC030         ;GO IF NOT NEGATIVE
7F67 19        00740          ADD     HL,DE             ;RESTORE RESIDUE
7F68 DD7E00    00750          LD      A,(IX)            ;CONVERT TO ASCII
7F6B FD7701    00760          LD      (IY+1),A          ;PUT IN BUFFER
7F6E D1        00770          POP     DE              ;GET TABLE START-1
7F6F 13        00780          INC     DE              ;NOW TABLE START
7F70 19        00790          ADD     HL,DE           ;POINT TO CHAR
7F71 7E        00800          LD      A,(HL)          ;GET LAST CHAR
7F72 FD7702    00810          LD      (IY+2),A        ;SAVE IN BUFFER
7F75 C9        00820          RET                     ;RETURN TO CALLING PROG
7F76 CD0B00    00830 XLATE    CALL    0BH             ;GET ADDRESS
7F79 113F00    00840          LD      DE,BIAS3        ;DISPLACEMENT
7F7C 19        00850          ADD     HL,DE           ;COMPUTE TABLE ADDRESS
7F7D E5        00860          PUSH    HL              ;TRANSFER TO IX
7F7E DDE1      00870          POP     IX
7F80 1E28      00880          LD      E,40            ;# OF BYTES IN TABLE
7F82 DDBE00    00890 XLA010   CP      (IX)              ;COMPARE A TO TABLE ENTRY
7F85 2806      00900          JR      Z,XLA020          ;GO IF MATCH
7F87 DD2B      00910          DEC     IX                ;BUMP TABLE PNTR
7F89 1D        00920          DEC     E                 ;DECREMENT COUNT
7F8A 20F6      00930          JR      NZ,XLA010         ;GO IF MORE
7F8C 1C        00940          INC     E               ;ADJUST POINTER
7F8D 1D        00950 XLA020   DEC     E               ;ADJUST INDEX
7F8E 1600      00960          LD      D,0             ;INDEX NOW IN DE
7F90 C9        00970          RET                     ;RETURN
7F91 30        00980 TABLE    DEFM    '0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ;,()'
     31 32 33 34 35 36 37 38
     39 41 42 43 44 45 46 47
     48 49 4A 4B 4C 4D 4E 4F
     50 51 52 53 54 55 56 57
     58 59 5A 3B 2C 28 29
0007           00990 BIAS1    EQU     ENC030-ENC020
005F           01000 BIAS2    EQU     TABLE-1-DECODE-3
003F           01010 BIAS3    EQU     TABLE+39-XLATE-3
0000           01020          END
00000 TOTAL ERRORS
```

Listing 4. Relocation Test

```
50 FOR I=254 TO 0 STEP -1
60 POKE 32513+I,PEEK(32512+I)
70 NEXT I
100 DEFUSR0=&H7F01:DEFUSR1=&H7F2F
110 INPUT A$
120 B=VARPTR(A$):C=PEEK(B+1)+PEEK(B+2)*256:IF C>32767 T
     HEN C=C-65536
130 A=USR0(C)
140 PRINT PEEK(C),PEEK(C+1)
150 A=USR1(C)
160 PRINT A$
170 GOTO 110
```

"Send your entries to the address at the end of this column. . . and be sure to specify what kind of fool you are."

1—65536? An example of a slow loop is:

```
                (HL) = count, 0-65535
LOOP   DEC   HL
       LD    A,H
       OR    L
       JR    NZ,LOOP
```

Number Two: What do these three instructions do to the contents of HL?

```
SR1   CALL   SR2
SR2   ADD    HL,HL
      RET
```

Number Three: What does the following code do? (Thanks to Ron Markel.)

```
LD     (HL),A
DEC    B C
LD     D , H
LD     E , L
INC    D E
LDIR
```

Number Four: A value of 0—15 decimal must be converted as shown below. What are the fewest number of instructions to do this?

0 to 30H	4 to 34H	8 to 38H	C to 42H
1 to 31H	5 to 35H	9 to 39H	D to 43H
2 to 32H	6 to 36H	A to 40H!	E to 44H
3 to 33H	7 to 37H	B to 41H	F to 45H

Number Five: Find the integer portion of log base 2 of a value in the A register, with the result in any register. Examples:

1 produces a value of 0
2 produces a value of 1
3 produces a value of 1
4 produces a value of 2
5 produces a value of 2
15 produces a value of 3
25 produces a value of 4
37 produces a value of 5

Number Six: What does the following code do?

```
        JR   NEXT+1
NEXT    JR   NEXTP1-1
NEXTP1  .
        .
```

Number Seven: A contains a signed value. What does it contain after:

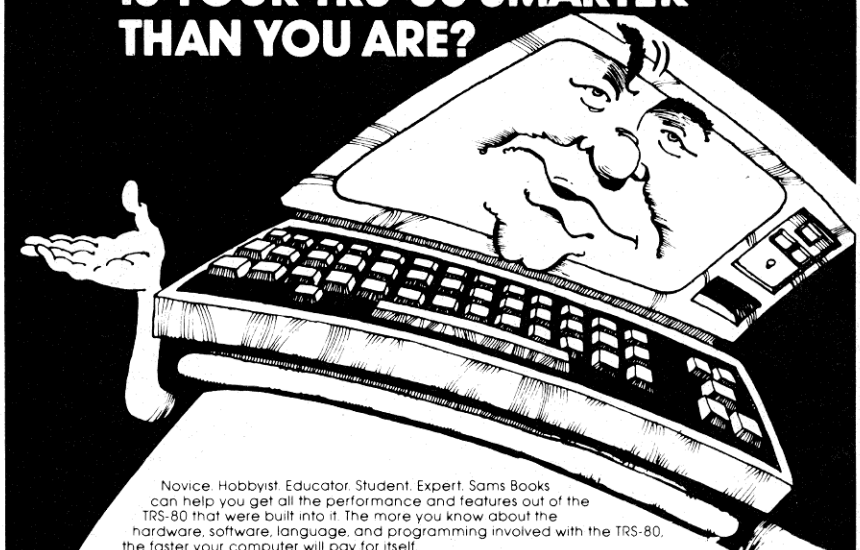
```
NEG
CPL
```

Number Eight: What is the purpose of TWDEE and TWDUM? (Thanks to Bill Schroeder of Galactic Software.)

```
SR      CALL   TWDEE
        .
        .
        .
TWDEE   EX     (SP),HL
        PUSH   DE
        PUSH   BC
        PUSH   AF
        LD     DE,TWDUM
        PUSH   DE
        JP     (HL)
TWDUM   POP    AF
        POP    BC
        POP    DE
        POP    HL
        RET
```

That's it for this month. Keep sending those cards, letters, and contest entries to: William Barden, Jr., Department Infinite Loop, 28182 Palmada, Mission Viejo, CA 92692. ■

IS YOUR TRS-80 SMARTER THAN YOU ARE?



Novice. Hobbyist. Educator. Student. Expert. Sams Books can help you get all the performance and features out of the TRS-80 that were built into it. The more you know about the hardware, software, language, and programming involved with the TRS-80, the faster your computer will pay for itself.

THESE SAMS BOOKS WILL HELP YOU USE ALL THE TRS-80 FEATURES YOU PAID FOR

TRS-80 INTERFACING Books 1 & 2, By Jonathan A. Titus. Book 1 introduces the signals available within the TRS-80 and how to use them to control external devices. Book 2 explores more advanced interfacing techniques that will allow you to do real things that you didn't even know your TRS-80 could do. BOOK 1 No. 21633, $8.95. BOOK 2 No. 21739, $10.95. TWO-VOLUME SET—Books 1 & 2 No. 21765, $18.50.

Mostly BASIC: Applications for your TRS-80, By Howard Berenbon. No. 21788 $11.95. Contains over 15 actual programs for home, entertainment, business, financial and educational use on the TRS-80.

Z-80 MICROCOMPUTER HANDBOOK. By William Barden, Jr. No. 21500 $8.95. The more you know about the Z-80 microprocessor—the heart of the TRS-80—the more you can get out of your computer. Here is everything you should know about the hardware, software and microcomputers built around the Z-80.

Z-80 MICROPROCESSOR PROGRAMMING & INTERFACING Books 1 & 2, By Elizabeth A. Nichols, Joseph C. Nichols, and Peter R. Rony. Book 1 explores Z-80 software and machine language programming. Book 2 addresses interfacing digital circuits with the Z-80 CPU, PIP, and CTC chips. BOOK 1 No. 21609 $11.95; BOOK 2 No. 21610 $14.95; TWO-VOLUME SET—Books 1 & 2 No. 21611 $24.95.

Sams Books® ✓366

Mail to: **Howard W. Sams & Co., Inc.,** 4300 West 62nd Street, P.O. Box 7092, Indianapolis, IN 46206. (317) 298-5400

			Quantity
TRS-80 Interfacing—Book 1	No. 21633	$ 8.95	
TRS-80 Interfacing—Book 2	No. 21739	$10.95	
TWO-VOLUME SET—TRS-80 Interfacing Books 1 & 2	No. 21765	$18.50	
Mostly BASIC: Applications for your TRS-80	No. 21788	$11.95	
Z-80 Microcomputer Handbook	No. 21500	$ 8.95	
Z-80 Microprocessor Programming & Interfacing, Book 1	No. 21609	$11.95	
Z-80 Microprocessor Programming & Interfacing Book 2	No. 21610	$14.95	
TWO-VOLUME SET—Z-80 Microprocessor Programming & Interfacing Books 1 & 2	No. 21611	$24.95	

Amount of order $____
Add local sales tax where applicable $____
Shipping & handling costs $ 2.00
Total amount of order $____

☐ Payment Enclosed ☐ Check ☐ Money Order
☐ VISA ☐ Mastercard Interbank No. ____ (minimum credit card purchase $10)
Account No. ____ Expiration Date ____
Name (print) ____ Signature ____
Address ____
City ____ State ____ Zip ____

Prices subject to change without notice. All books available from Sams Distributors, Bookstores, and Computer Stores. Offer good in U.S.A. only. In Canada, contact Lenbrook Industries Ltd., Scarborough, M1H, 1H5, Ontario, Canada. **Offer expires 9/30/81**

AD083

✓See List of Advertisers on page 306

80 ACCOUNTANT

by Michael Tannenbaum C.P.A.

"I watched the. . . salesman trying to save a. . . sale. . . . he lost and the customer wandered out. . . convinced that the 'ugly box' could have little use in his office."

"I don't like the color of the box." That comment, overheard at a local Radio Shack Computer Center made me drop what I was doing and strain to hear the rest of the conversation.

"If it were only blue, or a more stylish color, instead of that ugly grey color, I would buy it." The speaker was referring to the Model II on which a General Ledger demo was running.

Fighting my impulse to join the discussion, I watched the young salesman desperately trying to save a potential sale. Unfortunately, he lost and the customer wandered out completely convinced that the "ugly box" could have little use in his office.

In computers as well as books, a pretty cover can be very deceiving. The value of a popularly priced, mass market computer cannot be seen until you consider the wealth of software that has become available for it. With the flexibility of the Model II, one can move out of the TRSDOS environment into the business standard, CP/M. With this operating system, thousands of useful business programs are available at exceptionally low costs.

VisiCalc User Report

The VisiCalc program dramatically demonstrates this usefulness. This program can pay a user back almost immediately. Brian Gaines, a friend and stock market Registered Representative, put it to use immediately.

Brian uses VisiCalc as a portfolio monitor in an interesting way, and has offered to share his experiences with our readers. I'll turn the column over to him.

One of the most often promised and seldom delivered offers of a stockbroker is the portfolio review. Writing out a client's portfolio list and calculating a variety of totals and percentages is time-consuming and tedious work. When finished, it has to be refigured for each proposed change and updated to reflect constantly changing prices.

Typing all this data requires a good two hours for each ten positions, just to get a first draft, then the draft must be proofed and re-typed. Frankly, the typos alone will discourage you from prospecting for new portfolios.

Of course, there had to be a better way, and VisiCalc and the Model II appear to be the answer. Anything you currently calculate in tabular form can be handled by this combination. Some examples include:

- Covered Options Writing
- Portfolio Profit and Loss Schedules
- Commissions Due Schedules
- Margin Interest Charged Reports
- Portfolio Evaluations

Portfolio evaluations alone have already paid for my own system many times over. The ability to produce such alternative evaluations for clients have resulted in transactions that have netted me commissions of up to $29,000. With VisiCalc I can evaluate 40 possible transactions for my client in a short time; by hand the best I could have done was only four or five.

To set up my portfolio evaluation worksheet, I load VisiCalc and type the column headings as shown in Fig. 1.

Items labeled "None" require manual entry, and all others are automatically calculated by the VisiCalc program. Once the position is entered, only the current market figures have to be changed to update the position instantly. As an extra bonus, if position data is entered by category, such as equities, munis, corps, converts or options, subtotals can be created for each category.

Every time you change the information in any of the elements all figures will be recomputed.

Once the portfolio has been set up, it should be saved on disk for future use. VisiCalc can handle even the largest portfolios—up to 64 column headings and 100 lines of positions.

With the worksheet and my Lineprinter IV, I can print a copy of the worksheet on embossed stationery. No typos, no wasted time. With VisiCalc, I can tell a client that he has, for example, only 18 percent of his portfolio in utilities and that his overall yield would increase 200 basis points (2 percent) if he buys another 400 Con Ed.

Visicalc's speed allows me to display a portfolio, update its current market value and discuss alternatives with my clients over the phone. Best of all, we can discuss "what if" strategies and see the results dynamically displayed.

The Target System

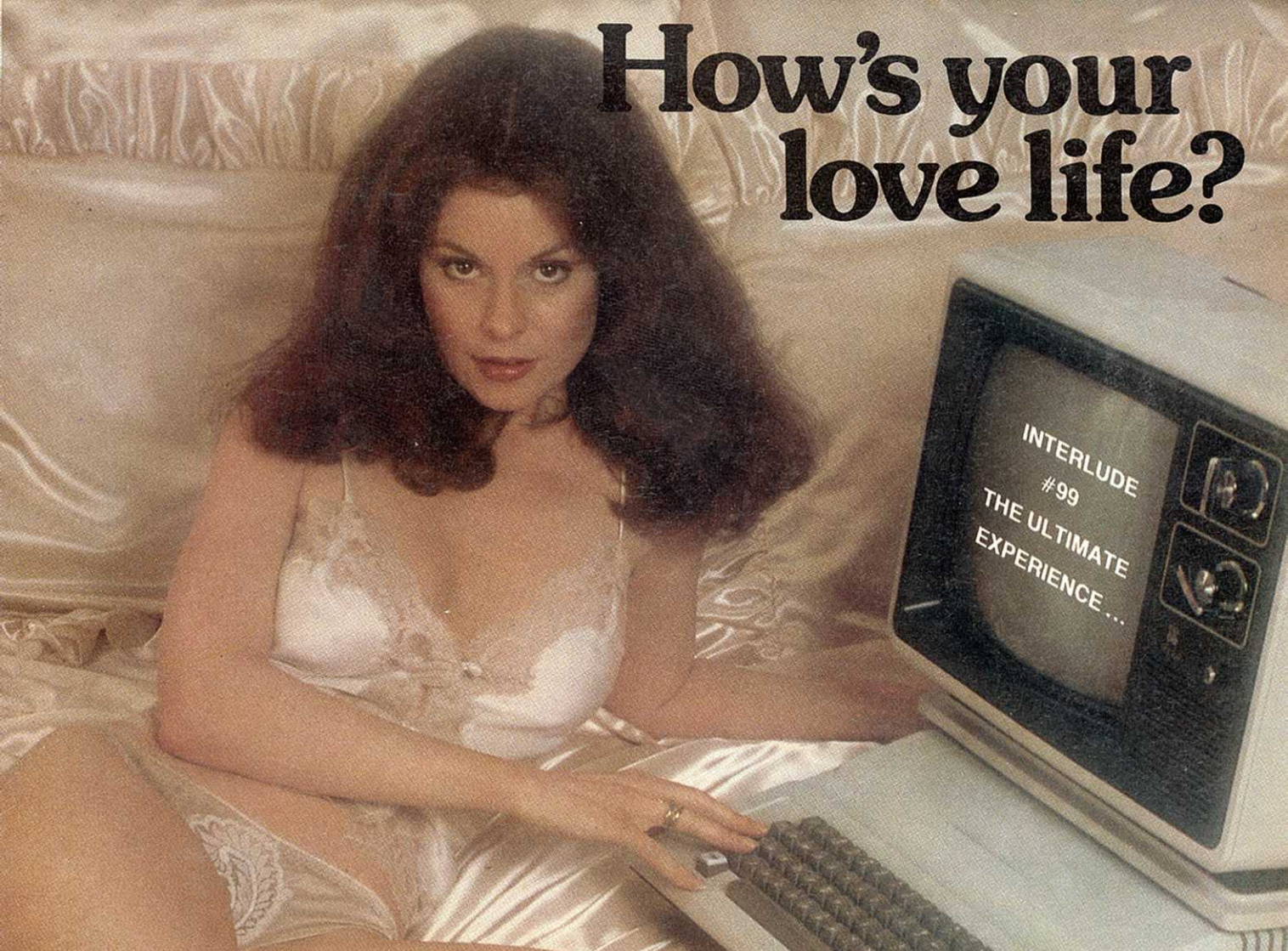
Brian has illustrated one effective use of VisiCalc, but it's not the only management tool that can have an immediate payback. In last month's column, I suggested that VisiCalc could be used for management planning. No sooner had I posted the column, when I received an intriguing flyer from a firm called Advanced Management Strategies, Inc., Atlanta, GA.

This organization has developed a planning system called Target. Target is intended to be the first element in a series of management planning assists to run on a CP/M system. Needless to say, I request-

COL	HEADING	CALCULATION	DESCRIPTION
A	Security	None	Name or ticker symbol
B	No. of units	None	No. of shares or the face value of bonds.
C	Total cost	None	Original cost or sales proceeds (negative)
D	CMV/unit	None	Current market value
E	Total CMV	B × D	Extension col. B × col. D
F	% to CMV	B/totEx100	% of holding at current market value
G	Current P&L	E-C	Unrealized gain or loss
H	% P&L	G/C × 100	Current unrealized gain or loss as a % of total
I	Inc/unit	None	Dividend per share or interest per $1.00 face
J	Annual Inc	B × I	Income for position
K	Current Yld	J/E × 100	Yield for position
L	LT or ST	None	Long term or short term or transaction date

Fig. 1. Portfolio Evaluation Worksheet

How's your love life?



A little dull around the edges? Routine? Predictable? Boring? Maybe all it needs is a little Interlude. Interlude is the most stimulating computer game ever conceived. It combines a computer interview, an innovative programming concept, and a one-of-a-kind manual to turn your love life into exciting, adventurous, delicious fun!

Interlude is: romantic... playful... outrageous... a fantasy. Interlude is: ■ A Bed of Roses (Interlude #1) ■ Mata Hari (Interlude #49) ■ The Chase (Interlude #7) ■ Rodeo! (Interlude #71) ■ The King and I (Interlude #60) ■ Some Enchanted Evening (Interlude #84) ■ Caveman Caper (Interlude #82) ■ From Here to Ecstasy (Interlude No. 30) ■ Satin Dreams (Interlude #72).

More than 100 Interludes are included in the program. Most are described in detail in the accompanying manual, but several surprise Interludes are buried in the program awaiting that very special time when your interview says you're ready. (When you learn secret Interlude #99, your love life may never again be the same!) Interlude can give you experiences you'll never forget. Are you ready for it?

Interlude™
The Ultimate Experience.

✓287

INTERLUDE, 10635 Richmond, Houston, Texas 77042. I'm really ready. Send my Interlude today.

Apple II (16K)*
☐ Cassette ($16.95)
☐ Diskette ($19.95)
☐ Diskette—Pascal or DOS 3.3 ($19.95)

TRS-80 (Level II-16K)**
☐ Cassette ($16.95)
☐ Diskette ($19.95)

Poster
☐ 20"x 24" reproduction of this ad without ad copy ($4.95—includes shipping charges)

Add $1.50 for shipping and handling.

Available for immediate shipment.

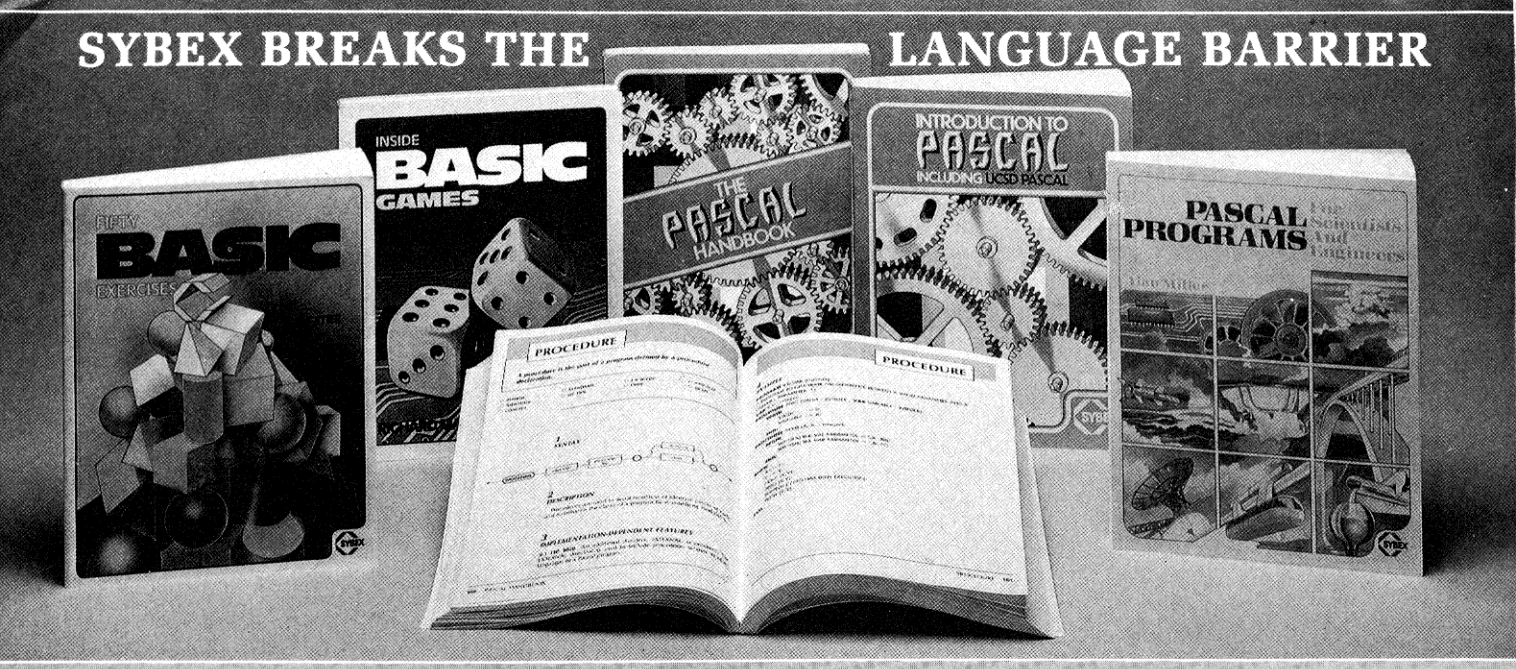
Please enclose your check payable to INTERLUDE or complete the charge information:

☐ MASTERCARD ☐ VISA All charge customers must sign here. _____
Account No. _____ Expiration date _____ MasterCard Bank Code _____

CHARGE CUSTOMERS: Order by phone toll-free! **1-800-231-5768 Ext. 306** (Texas: 1-800-392-2348 Ext. 306)
Name _____ Age _____
Address _____
City _____ State _____ Zip _____

*Apple II is a registered trademark of Apple Computers, Inc. **TRS-80 is a registered trademark of Radio Shack, a Tandy Co.

SYBEX BREAKS THE LANGUAGE BARRIER



Let the chips fall where they may. These two books on BASIC assure comprehension and competence.

■INSIDE BASIC GAMES

by Richard Mateosian teaches interactive game design and BASIC programming through thorough analysis of eight different kinds of computer games. Programs are presented in Microsoft BASIC with versions for PET/CBM, TRS-80 and APPLE II.
350 pp., 120 illustr., Ref. B245, $13.95

■FIFTY BASIC EXERCISES

by J.P. Lamoitier provides the surest way of learning BASIC—actual practice. Graduated exercises, each containing a detailed explanation, flowchart and sample run, develop skill and competence rapidly. Applications include mathematics, business, operations research, statistics and more.
256 pp., 194 illustr., Ref. B250, $12.95

Get in gear and accelerate your programming productivity with Pascal's power.

■INTRODUCTION TO PASCAL

by Rodnay Zaks is a simple yet comprehensive guide to standard and UCSD Pascals: step-by-step presentation with exercises for beginners, complex concepts and extensive appendices for experienced programmers. An indispensable book for everyone who wants to learn Pascal programming.
320 pp., 100 illustr., Ref. P310, $14.95

■THE PASCAL HANDBOOK

by Jacques Tiberghien is an easy-to-read, easy-to-use dictionary containing all the features for most existing versions of Pascal (Standard, Jensen-Wirth, OMSI, UCSD, HP1000, Pascal/Z). Over 180 entries, arranged alphabetically; each includes definition, description, syntax diagram, details of implementation, variations and examples. The perfect reference tool for any Pascal user.
500 pp., 150 illustr., Ref. P320, $14.95

Scientists and engineers involved in significant work have been delayed by having to reinvent algorithms for a new computer language. No more.
AVAILABLE MAY 1981

■PASCAL PROGRAMS FOR SCIENTISTS AND ENGINEERS

by Alan Miller is a comprehensive collection of frequently used algorithms for scientific and technical applications programmed in PASCAL. This time saving book includes programs for curve fitting, fast Fourier transform, approximations, random number generation, integrals, statistical techniques and more.
250 pp., 80 illustr., Ref. P340 ☐$16.95 paper, ☐$25.00 cloth

MORE SYBEX BOOKS

■YOUR FIRST COMPUTER *by Rodnay Zaks*
280 pp., 150 illustr., 2nd Edition, Ref. C200A, $7.95

■MICROPROCESSORS: FROM CHIPS TO SYSTEMS *by Rodnay Zaks*
420 pp., 250 illustr., 3rd Edition, Ref. C201, $12.95

■MICROPROCESSOR INTERFACING TECHNIQUES *by Rodnay Zaks & Austin Lesea*
464 pp., 400 illustr., 3rd Edition, Ref. C207, $15.95

■PROGRAMMING THE 6502 *by Rodnay Zaks*
392 pp., 160 illustr., 3rd Edition, Ref. C202, $12.95

■6502 APPLICATIONS *by Rodnay Zaks*
288 pp., 207 illustr., Ref. D302, $12.95

■6502 GAMES *by Rodnay Zaks*
304 pp., 140 illustr., Ref. G402, $12.95

■PROGRAMMING THE Z80 *by Rodnay Zaks*
620 pp., 200 illustr., 2nd Edition, Ref. C280, $14.95

■PROGRAMMING THE Z8000
by Richard Mateosian
312 pp., 124 illlustr., Ref. C281, $15.95

■THE CP/M HANDBOOK (With MP/M)
by Rodnay Zaks
336 pp., 100 illustr., Ref. C300, $14.95

✓324

SYBEX

MAIL TO:
SYBEX DEPT. 8M5
2344 SIXTH STREET
BERKELEY, CA 94710
PHONE ORDERS:
INSIDE CA 415/848-8233
TOLL FREE OUTSIDE CA 800-227-2346

or at book and computer stores everywhere

NAME _____ ☐ SEND ME YOUR FREE CATALOG
ADDRESS _____
CITY _____ STATE _____ ZIP _____
ADD ☐$1.50/book UPS or ☐75¢/book 4th class mail or ☐$8/book overseas airmail
(CA add tax) Total Amt. Enclosed _____ OR CHARGE MY ☐VISA ☐MC ☐AM EX.
CARD NO. _____ EXP. DATE _____
SIGNATURE _____

ed a copy immediately.

Within a week, I received a 60-plus page manual, an eight inch disk, and a reference card. Compared to some, the manual is a model of clarity. It contains four color-coded sections. The first contains step by step instructions on how to use the system and an index. The second section contains specifications for the version of Target supplied.

In a special section are models which illustrate the features of the Target system. (These models were thoughtfully reproduced on the system disk furnished.) The remaining section highlights enhancements added to the version of Target supplied, which have not been included in the first section of the manual.

The manual suggests reading the second section on specifications *before* trying to use Target. This recommendation should be observed, especially if the user has never used a CP/M (Control Program Microcomputer) operating system before. Attempting to boot up a CP/M disk without that operating system results in an RS error rather than a No System message.

The Target, version 2.1 supplied to me is designed to work with Lifeboat Associates, New York, NY CP/M version 2.2 or greater. It consists of five programs and three files. Each program is a machine language compilation of a BASIC program. Therefore, you will be unable to list the source code.

One major advantage of a compiled BASIC program is that its execution speed is considerably greater than that of an interpreted program. Target runs considerably faster than the T/Maker system I reviewed previously. Another major advantage, or disadvantage depending on your point of view, is that you cannot tinker with the source code. Therefore, you will be completely dependent on the vendor for program enhancements or corrections should bugs occur.

Compared to VisiCalc

Advanced Management Strategies takes their obligation to support their customers seriously. During the evaluation phase, when I had difficulty with a program, their program support director had a copy of the system disk sent to me. Together we worked on and resolved the problem.

Once up and running, Target bears a strong resemblance to VisiCalc. Like VisiCalc, data is presented in tabular form. Calculations can be made to sum lines, generate data, create percentage relationships and sum columns. However, Target goes beyond VisiCalc by allowing logical tests of these calculations. IF tests, for example, can be made by the computer and the calculation of data altered dynamically.

To illustrate this, let's consider calculating an income tax. Typically, income taxes are calculated using a table of values, with the tax bite getting progressively greater at each table break. Target's logical tests can identify a step point and use a higher tax rate should projected income increase. This feature will be particularly handy projecting purchases where volume discounts are a factor.

Unlike VisiCalc, data and resulting calculations are not entered directly on a worksheet. Target treats this information as a separate file. To place a display file of information in a format suitable for printing, the file must be run. After a display file is created, it can be examined at any time by hitting the ESC key.

. . . "you will be completely dependent on the vendor. . . should bugs occur."

After becoming accustomed to VisiCalc, data entry to a file seems archaic, however, there are significant advantages. The most important advantage is that all calculations and information are obvious in reviewing the file. With VisiCalc, it is easy to lose track of which figures are input and which are calculated. Target gets around the forgetfulness factor by requiring row labels be used as descriptors when defining calculations.

Row labels are limited to eleven characters; any more are ignored. If more than one word is used as a label, an apostrophe (') must be entered in place of the space. The apostrophe is printed as a space. While this does not result in very descriptive row titles, careful abbreviations generate acceptable reports.

Target is loaded from the CP/M by simply typing "TARGET". The initial display prompts you to enter the code of the data disk. In a CP/M system the drives are coded A,B,C,D, corresponding to the TRSDOS 0,1,2,3. Once the disk is named, Target requests the number of columns desired. If the return key is depressed, a default of three is selected.

The system next prompts you for the number of decimals to be displayed on the output reports. If return is selected, the system will default to an integer output. Finally, you are asked to specify the output report date. Selecting return suppresses the date and displays the main menu.

Change Command Available

From the menu, the user can create a new model, or recall a previously saved model. To facilitate recall, a directory command is available which displays file names of models stored on the disk. The menu also allows the operator to save a memory file or erase a previously saved disk file. Should you decide to alter a model's size or number of decimal places in the output report, a change command is available on the menu.

Once an option is selected, the system displays the data entry screen. Its chief feature is the guideline displayed on line one that uses the reverse print highlighting feature of the Model II. Within the guideline is exhibited the model name, number of characters available for model storage, column counter, decimal indicator and mode indicator.

Target uses historical data to calculate initial model values. These historical values are entered in parentheses. The historical values do not appear on the output reports.

Line commands can contain data, arithmetical operations (^,*,/,+,−), logical statements (IF. . . THEN. . . ELSE) or functions. Like VisiCalc, Target supports line summing functions, MIN, MAX, and AVE. Unlike VisiCalc, there is no present value function. Target has the unique functions of CUM, GREATER OF, LESSER OF and GROW BY.

The CUM function enters the cumulative total of all the lines to that point into the current column. GREATER OF and LESSER OF allow a choice of values to be entered into the report and subsequent calculations. GROW BY allows a programmed growth factor to be applied to each value calculated for a column within the row.

Target has column commands which are applied to the entire column vector. Arithmetic, logical and some functional operations are permitted.

To further dress up your report, heading, skip, underline and overline commands are accepted. The heading can contain up to 252 characters. After formatting is complete and the model is run, the report can be saved or printed. You can print the entire report or sections.

With its advanced features and quick execution time, Target is worth a good long look at your nearest computer store. ■

80 APPLICATIONS

by Dennis Kitsz

"This month's column presents a miniature window similar to those in early microcomputers and minicomputers."

Hmmmmm, let's see. S-Y-S-T-E-M. Okay, enter that. Good, there's the prompt. Now, what was that address? Aha, here it is. Type the slash, then 2-0-4-8-0. Now enter that. Gone. Damn! Electronic never-never land again! Where is it? What's it doing? Just locked up...maybe I'll hit reset. Seems to...-Arrgh! MEMORY SIZE?

If you've been entering machine language programs—your own, or those from *80 Microcomputing* or elsewhere—chances are you have experienced maddening moments like these. Positive the coding is correct, you direct the computer to execute the routine, and it promptly hangs up. If you're skilled at using machine language monitors and breakpoints, it's possible (very painstakingly) to trace the course of the program until you find a flawed area. The process is time-consuming and unrewarding.

"The micro front panel is simple to build, and can be completed in an evening..."

Certain machine language monitor programs offer a kind of window into the computer's operation by emulating a program rather than letting it run under its own control. It seems like the program is running, but it is actually being run by the emulator. Instructions appear slowly disassembled on the screen and, if you've got the time, the program will eventually reach the trouble spot.

Earlier microcomputers had few of these software comforts. Programs were entered a byte at a time by selecting addresses through a bank of 16 switches, and entering data using eight other switches. It was all binary. But that method *did* provide a hardware "window"—each address and data bit was displayed on a row of LEDs which winked and blinked as the computer performed its operations. This switch-laden window was called the front panel.

If the computer happened to hang up, the address area would be flashing away before your eyes. With a quick calculation, the binary digits could be converted to hexadecimal (or octal in those misty past days), the computer recalled from its locked up state, and the incorrect code changed.

This month's column presents a miniature window similar to those in early microcomputers and minicomputers. You may watch the address and data change while the CPU reads from memory, writes to memory, inputs from a port, or outputs to a port. The entire project fits on a one-inch by four-inch piece of perfboard, which plugs into the edge card connector of the TRS-80 (Photo 1).

For this project, you will need four integrated circuits (one 74LS20 and three 74LS373), twenty-four 270-ohm resistors, four 1K-ohm resistors, one four-position DIP switch, and a 5-volt power source. A transistor battery and a 7805 (also known as a 340T-5) voltage regulator will do for the 5-volt source or a 9-volt battery eliminator together with the voltage regulator. The display will also require 24 micro LEDs (sold in packs of four for 88 cents at Radio Shack, catalog number 276-032) or three 10-step LED bar displays (also at Radio Shack, $3.79 each, catalog number 276-081).

Fig. 1 presents the complete circuit for the micro front panel, and Fig. 2 shows two power supply options for it. The sixteen address lines and eight data lines are fed to the inputs of the 74LS373s. These integrated circuits contain eight latched flip-flops in each; when a rising clock pulse is sent to pin 11 of these circuits, the data present at their inputs is latched to the outputs.

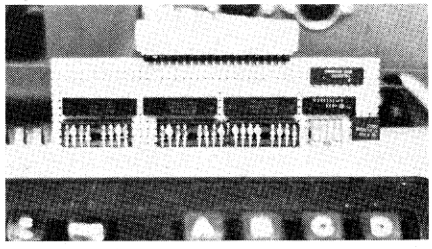


Photo 1. Micro front panel connected to the TRS-80. It is slightly wider than the numeric keypad.

The read (RD), write (WR), input (IN), and output (OUT) lines lead through a switch to the input of a 74LS20 four-input NAND gate (Z4). When the switches are open, the inputs to Z4 are all high, holding its output low. When a switch is closed, the output of Z4 remains low until the respective input line is activated. A read signal, for example, switches the RD line from its normal high (one) state to a low (zero) state. The presence of a low on any input of the NAND gate causes its output to swing high, latching data and address into the 74LS373s, Z1 to Z3.

"In any case, enjoy. Just watching those LEDs is a delight."

The outputs of Z1, Z2 and Z3 should not normally be expected to light LEDs. But that is their only function in this circuit, so the current demanded by the LEDs does not overexert the 74LS373s.

The micro front panel is simple to build, and can be completed in an evening using wire-wrapping technique. The individual LEDs can be inserted into integrated circuit sockets to avoid soldering them or wire-wrapping their smooth, round leads. When ten-segment bar displays are used, they can be inserted into sockets; two segments of each package are left unconnected, breaking the display into three groups of eight digits.

To have the displays read properly in binary, the least significant bit of the address bus should be on the right, and the most significant bit on the left. The pat-

RUN YOUR OWN COMPUTER BULLETIN BOARD!

Become a CONNECTION-80 SYSOP! with an Auto-Connection Modem, Message-80 BBS Software (by Richard Taylor) and CONNECTION-80 Enhancements (by Tom Vande-Stouwe) all for only $389.00 ($90 off regular price!!)

– OR–

Run a mini Bulletin Board with an AutoConnection Modem and Superhost (by Clay Schneider) for only $279.00 ($30.00 off regular price!!)

AutoConnection (See Below) $279.00
Message-80 BBS (by Richard Taylor) 149.95
CONNECTION-80 Enhancements $49.95
(by Tom Vande-Stouwe)
SuperHost (by Clay Schneider) $29.95

Other Bulletin Board and Electronic Mail Packages available.

Call for more info. ✓60

TIC-TOC 80
Micro·Clock
FOR THE TRS-80 MODEL I & III

✓61 for FREE Keybounce Kit!!

Put a wrist watch on your Computer. Gives Time, Date, and day of week, without the need of operator input! Runs on Batteries, so it never needs to be reset. When used with devices such as the auto dial connection, it provides a message center that will send messages WHILE YOU ARE NOT EVEN THERE! Gives you the ability to enter data with the knowledge that the date and time is correct, without having to set the clock! Includes complete instructions, and sample routines.

Complete Package. (Model I TRS-80)... $99.00
Complete Package. (Model III TRS-80) $109.00
Special! if purchased ✓122
with BBS package, deduct..... $20.00

ELECTRONIC ORDERING IS HERE
CONNECTION-80 CBBS (516) 588-5836

VISA master charge

COMMUNICATE!!

MICROCONNECTION– $249.00
For Model I or III, decodes the TRS-80 buss and creates an RS-232 port. Eliminates need for expansion box and/or RS-232 board. Provides serial printer output. Requires software written for port 208. Requires adapter cable for Model III.

RS232CONNECTION– $199.96
Works with virtually any computer or terminal having an RS-232 serial I/O port. Replaces obsolete acoustic coupled modems. Compatible with all TRS-80 terminal software. Requires RS-232 cable.

COLORCONNECTION– $199.95
Converts Radio Shack Color Computer into a communications terminal. Provides serial printer output. Does not require any additional memory or extended basic. Complete with cables.

AUTOCONNECTION– $79.95 (option)
This option permits CONNECTIONS (except Color) to answer the telephone and/or dial numbers automatically. Supplied with a dialer demonstration program.

EUROPEANCONNECTION– $20.00 (option)
This option modifies the above units for European Standards.

MODEL III ADAPTER– $29.00
Cable converts Model III 50 pin buss to 40 pins used by Model I peripherals.

RS-232 CABLE– $24.00
Four-foot ribbon cable terminated with 25 pin male DB25 plugs.

SMART-80 and SMART III
By Dick Balcom ✓380

Smart Terminal Programs for the TRS-80+ Model I and Model III Computers! This is the ONLY Smart Terminal Program available for the Model III as of this printing! These programs are available in either cassette or disk versions for the Mod I and Mod III. these programs allow you to up AND down text and programs to your TRS-80+ from other users, Timeshare Systems (source, MicroNET), and free public BBS (CONNECTION-80, etc.). This software represents the State Of the Art in terminal software for the TRS-80+.

Smart-80(C), Smart III(C) automatically converts basic programs saved on Tokens to ASCII code, and back again. EDTASM tapes can also be loaded thru the terminal!

Smart-80(D) is the Disk based version of Smart-80 with the ability to transfer diskfiles to another user over both phone and radio with the use of a modem. These programs support Auto Log-on, as well as other features not found in other programs.

Smart-80(C) Modell $79.00
Smart III (C) Model III..... $99.00
(1500 Baud Tape)
Smart-80 (D) Model I $79.00
Smart III (D) Model III..... $99.00

B.T. Enterprises ✓478
171 Hawkins Road
Centereach, New York 11720

Dealer Inquiries Welcome

Add $2.00 S & H
NYS res. add appr. tax

(516) 981-8568 (Voice)
(516) 588-5836 (Data)
MNET-70331, 105

80 MICROCOMPUTING ANNOUNCES...

LOAD 80

. . . and saves you hours of typing and aggravation.

LOAD-80 is a monthly dump of the major program listings in 80 Microcomputing on cassette. Publisher Wayne Green tells you more. . .

"Frankly, after hundreds of hours of frustration, I seldom even try to keyboard a published program. Even if the magazine manages to get the program typeset correctly (which seems rare), I inevitably screw it up when I keyboard it. Who needs the aggravation?

"This is why I've started a new series of cassettes called **Load 80**. Each cassette will have program dumps of the listings in an issue of **80 Microcomputing**. These listings are direct from the authors and tested by the **80** staff. All but the very short program listings will be on these **Load 80** cassettes. Thus you will be able to save hours of inputting programs and even more of debugging your keyboarding errors.

"Though the authors of these programs will share the royalties from the sale of the cassettes, this will not preclude the better programs from being issued separately by Instant Software (with royalties) with full documentation and associated hoopla. The documentation for the **Load 80** programs will be entirely in **80 Microcomputing.**

"I originally was holding out for "Trash Dump" as a name for the cassettes, but cooler heads prevailed. If there turns out to be enough interest in **Load 80**, we'll set up a monthly subscription arrangement."

Wayne Green, Publisher

Send in the attached card and you will receive the cassette for the major programs in this issue (May 1981). If the card is gone, photocopy the coupon.

Please note there is no warranty expressed or implied that this program is going to do anything other than save you typing.

☐ Yes . . send my LOAD 80 Cassette for only $9.95

☐ Check Enclosed Bill my ☐ AE ☐ MC ☐ VISA

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CARD # _____ EXPIRE DATE _____

SIGNATURE _____ INTERBANK # _____

Please allow 4-6 weeks for delivery
80 Microcomputing Pine Street Peterborough NH 03458
Attn: Debra L. Boudrieau

315B8

tern applies to the data bus as well.

An Experiment

When the micro front panel is complete, plug it into the edge card of the computer, apply power, and turn the WR switch on. The LEDs will probably come on randomly, but as soon as the TRS-80 receives power they will stabilize into a discernible flicker surrounding one area of memory. Disk users, make sure you are in Level II BASIC, and press enter in response to MEMORY SIZE?

The addresses will read straight up through available memory, incrementing rapidly in binary. The effect will be most dramatic if you have a full 48K system.

Disk users can power up the system with no disk in place, watch the disk be commanded to spin, and the computer hang up. The address line will probably read 0100001000000001—that is 4201 hex, where the program expects to find the disk boot program.

From Level II BASIC, try this short routine:

```
POKE 20480,24 : POKE 20481,254   <ENTER>
SYSTEM                           <ENTER>
/20480                           <ENTER>
```

The system, as expected, hangs up. This program is the simple endless loop JR FE—that is, jump back to itself. Switch the WR line off and the RD line on. The address display will flicker in one area, but will mainly read 0110000000000000, which is 5000 hex (20480 decimal—see box). The least significant bit will be dim, meaning both 5000 and 5001 are being accessed alternately.

Press the reset button to get out of this loop, and put this routine in place:

```
POKE 20480,60 : POKE 20481,50  <ENTER>
POKE 20482,0  : POKE 20483,60  <ENTER>
POKE 20484,24 : POKE 20485,250 <ENTER>
SYSTEM                         <ENTER>
/20480                         <ENTER>
```

The video screen will jitter and shake, and at the top left corner a rapidly changing character will appear. With the RD line still switched in place, the display will flicker around 0110000000000000 (5000 to 5005 hex). Now switch the RD line off and the WR back on.

The display should show 0011110000000000, which is 3C00 hex, the first location of the video screen. In other words, the program is reading from 5000 to 5005 hex, but writing to the screen at 3C00 hex. The program in assembly language reads:

```
INC  A
LD   (3C00),A
JR   FA
```

Again, it is an endless loop, each time incrementing the value of A and writing it to the top left corner of the screen.

For the third demonstration, insert a cassette into the player as if you were going to load a program. Actually, the cassette may be any cassette, so long as something is recorded on it. Now enter this program:

```
POKE 20480,58  : POKE 20481,61    <ENTER>
POKE 20482,64  : POKE 20483,211   <ENTER>
POKE 20484,255 : POKE 20485,219   <ENTER>
POKE 20486,255 : POKE 20487,50    <ENTER>
POKE 20488,0   : POKE 20489,60    <ENTER>
POKE 20490,24  : POKE 20491,244   <ENTER>
SYSTEM                            <ENTER>
/20480                            <ENTER>
```

In assembly language, this translates to:

```
LD   A,(403D)
OUT  (FF),A
IN   A,(FF)
LD   (3C00),A
JR   F4
```

An explanation is in order here. At location 403D hex (16445 decimal), the status of port FF (255 decimal) is stored for use by BASIC during CHR$ (23), CLOAD, and SYSTEM. This program reads that status and sends it to port FF. When this information is written to that port, it resets the data input flip-flop without disturbing the cassette relay or screen character size.

In other words, when data comes into the cassette port it sets the flip-flop trigger. To read the presence of data, the

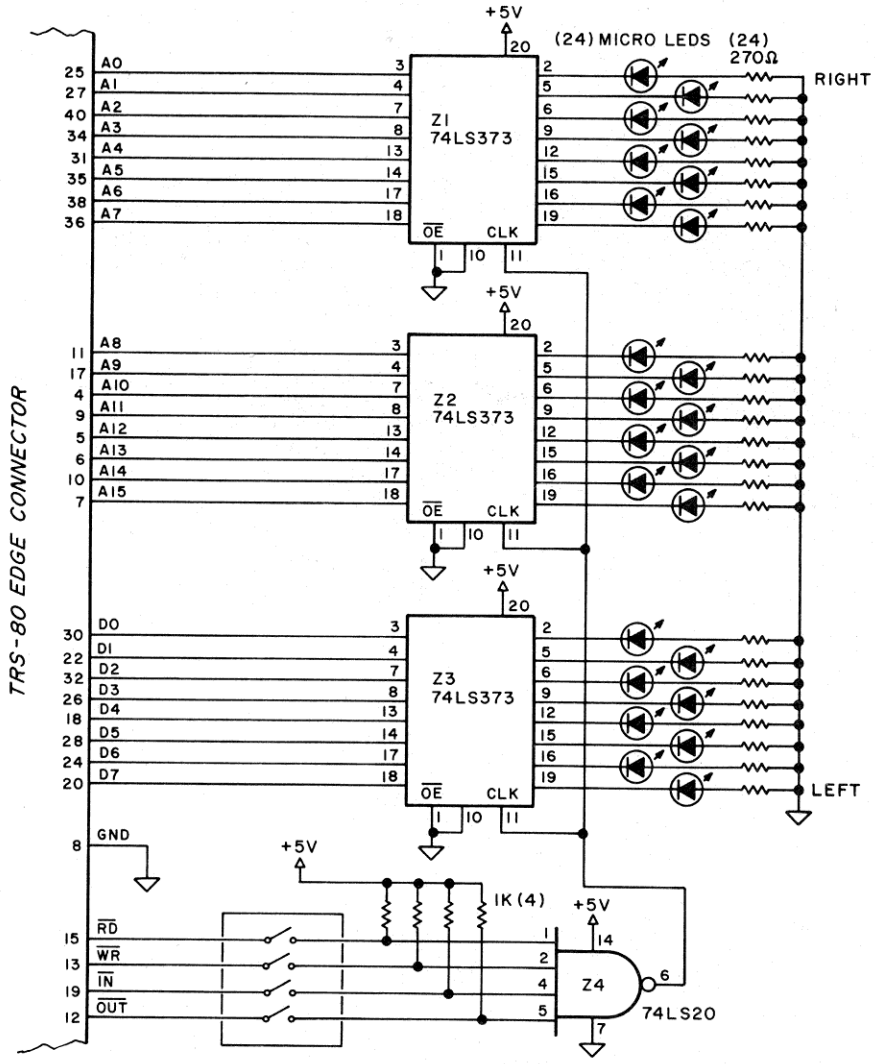


Fig. 1. Micro Monitor

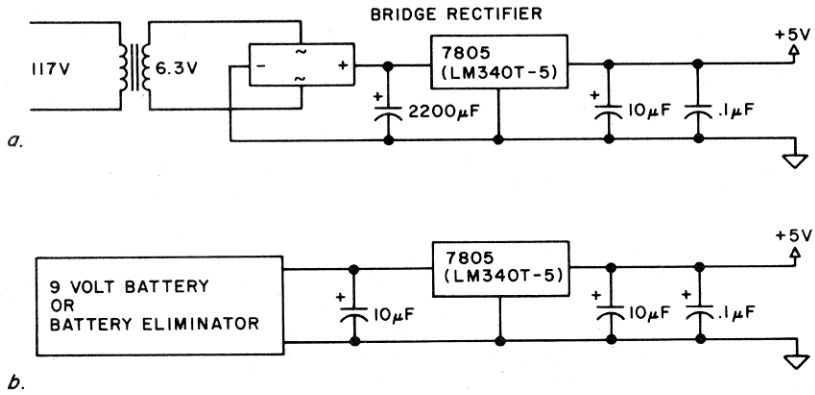
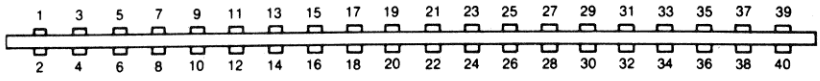


Fig. 2. Power Supplies for Micro Front Panel

P/N	SIGNAL NAME	DESCRIPTION
1	RAS*	Row Address Strobe Output for 16-Pin Dynamic Rams
2	SYSRES*	System Reset Output, Low During Power Up Initialize or Reset Depressed
3	CAS*	Column Address Strobe Output for 16-Pin Dynamic Rams
4	A10	Address Output
5	A12	Address Output
6	A13	Address Output
7	A15	Address Output
8	GND	Signal Ground
9	A11	Address Output
10	A14	Address Output
11	A8	Address Output
12	OUT*	Peripheral Write Strobe Output
13	WR*	Memory Write Strobe Output
14	INTAK*	Interrupt Acknowledge Output
15	RD*	Memory Read Strobe Output
16	MUX	Multiplexor Control Output for 16-Pin Dynamic Rams
17	A9	Address Output
18	D4	Bidirectional Data Bus
19	IN*	Peripheral Read Strobe Output
20	D7	Bidirectional Data Bus
21	INT*	Interrupt Input (Maskable)
22	D1	Bidirectional Data Bus
23	TEST*	A Logic "0" on TEST* Input Tri-States A0–A15, D0–D7, WR*, RD*, IN*, OUT*, RAS*, CAS*, MUX*
24	D6	Bidirectional Data Bus
25	A0	Address Output
26	D3	Bidirectional Data Bus
27	A1	Address Output
28	D5	Bidirectional Data Bus
29	GND	Signal Ground
30	D0	Bidirectional Data Bus
31	A4	Address Bus
32	D2	Bidirectional Data Bus
33	WAIT*	Processor Wait Input, to Allow for Slow Memory
34	A3	Address Output
35	A5	Address Output
36	A7	Address Output
37	GND	Signal Ground
38	A6	Address Output
39	+5V	5 Volt Output (Limited Current)
40	A2	Address Output

NOTE: * means Negative (Logical "0") True Input or Output



Mates with AMP P/N 88103-1 Card Edge Connector or Equivalent

Fig. 3. Edge card connector, from the TRS-80 Technical Reference Handbook

computer must first reset the trigger without messing up the screen or turning off the cassette motor. The first two instructions perform that function. The command IN A,(FF) reads that information into the accumulator, from where it is subsequently written to the screen.

Flip off the RD and WR lines of the micro front panel, and turn on the IN line. Start the cassette moving, and watch as the cassette data bit flickers in concert with the incoming audio signal. Try RD and WR in turn as well, which will show the program being read from the 5000 area and data being written to 3C00.

Finally, turn off all three lines and flip the switch to OUT. You can now see the steady data from 403D that is being output to port FF.

What Earthly Use?

Naturally, a front panel is not for every-

Reading the Binary

Looking at 24 blinking LEDs is a treat. It also gives you a feeling that you've got a *real* computer there. But to use the little flasher, you have to read the binary information.

When the LED is on, count that as a one; when it's off, you've got a zero. Break the string of ones and zeros into blocks of four, and use this table to convert the binary number to hexadecimal.

0000	0
0001	1
0010	2
0011	3
0100	3
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A
1011	B
1100	C
1101	D
1110	E
1111	F

Easy as can be. 1001011011010101 breaks into 1001 0110 1101 0101, which you can convert quickly to 9 6 D 5. To determine the decimal equivalent of this number, if you need it, refer to my "Applications" column in the March *80 Microcomputing.*

COLLEGE BOARDS

for TRS-80
PET, APPLE

The best way to sharpen your skills for the College Boards is to work on actual examinations. Each of these program sets confronts the user with a virtually limitless series of questions and answers Each program is based on past exams and presents material of the same level of difficulty and in the same form as used in the College Board examination. Scoring is provided in accordance with the formula used by College Boards.

SAT, PSAT, N.M.S.Q.T., set includes 7 programs covering Vocabulary, Word Relationships, and Mathematics. Price $79.95

EDUCATOR EDITION - SAT, PSAT Includes all of the above programs plus detailed solutions and explainations for each problem plus drill exercises. SAT set includes 14 programs. $149.95

GRADUATE RECORD EXAMINATION set includes 10 programs covering Vocabulary, Word Relationships, Mathematics, Logical Diagrams, Analytical Reasoning. $139.95

EDUCATOR EDITION - Graduate Record Exam Set includes 20 programs. $199.95

SWORD OF ZEDEK

Fight to overthrow Ra, The Master of Evil. In this incredible adventure game, you must confront a host of creatures, natural and supernatural. To liberate the Kingdom, alliances must be forged and treasures sought. Treachery, deceit and witchcraft must be faced in your struggles as you encounter wolves, dwarves, elves, dragons, bears, owls, orcs, giant bats, trolls, etc. Each of the 12 treasures will enhance your power, by making invisible, invulnable, more eloquent, more skillful in combat etc., etc., as you explore the realms of geography both on the surface and underground. Dungeons, temples, castles, mountains etc., are all a part of the fantastic world of Ra. Each game is unique in this spectacular and complex world of fantasy. $24.95

KRELL GAME PAK

Incredible bargain, 15 unique and challenging games!!!

Hostage	**Primary Fight**
Prime Time	**Black Gold**
The Black Death	**Wordsworth**
Star Clipper	**Hard Scrabble**
Bulls & Bears	**Bible Quode**
Banzai	**Shakespeare Quode**
Banzai II	**Bill of Rights Quode**
Super Banzai	*TRS-80 only, $39.95*

SUPER STAR BASEBALL

ALL TIME SUPER STAR BASEBALL Sample Lineup

B. Ruth	T. Williams
L. Gehrig	J. Foxx
J. DiMaggio	H. Greenberg
J. Jackson	R. Hornsby
G. Sisler	H. Wilson
S. Musial	B. Terry
T. Cobb	M. Mantle
W. Mays	H. Aaron
C. Young-P	W. Johnson-p

SUPER STAR BASEBALL Sample Lineup

D. Parker	J. Rice
W. Stargell	H. Aaron
W. Mays	L. Brock
P. Rose	R. Carew
O. Cepeda	H. Killebrew
C. Yazstremski	R. Allen
W. McCovey	R. Leflore
R. Jackson	R. Zisk
G. Brett	B. Madlock
R. Guidry-P	T. Seaver-p

Performance is based on the interaction of actual batting and pitching data. Game can be played by one or two players with the computer acting as a second player when desired. Players select rosters and lineups and exercise strategic choices including hit and run, base stealing, pinch hitting, intentional walk, etc. Highly realistic, there are two versions, ALL TIME SUPER STAR BASEBALL, and SUPER STAR BASEBALL featuring players of the current decade. Each includes about 50 players allowing nearly an infinite number of roster and lineup possibilities.

$14.95

TIME TRAVELER

The best of the adventure games. Confronts player with complex decision situations and the demand for real time action. Using the Time Machine, players must face a challenging series of enviornments that include; the Athens of Pericles, Imperial Rome, Nebuchadnezzar's Babylon, Ikhnaton's Egypt, Jerusalem at the time of the crucifixion, The Crusades, Machiavelli's Italy, the French Revolution, the American Revolution, and the English Civil War. Deal with Hitler's Third Reich, Vikings, etc. At the start of each game players may choose a level of difficulty... the more difficult, the greater the time pressure. To succeed you must build alliances and struggle with the ruling powers. Each game is unique. $24.95

✓375

*ALL PROGRAMS AVAILABLE FOR TRS-80, APPLE II & PET

*Programs for APPLE or TRS-80 are on disk or cassett, please specify.

KRELL SOFTWARE

Send check or money order to
21 Milbrook Drive, Stony Brook, NY 11790
(516) 751-5139

All programs require 16K ● TRS-80 programs require LEVEL II BASIC ● APPLE programs require Applesoft BASIC

✓See List of Advertisers on page 306

one. If your forte is BASIC, chances are you'll hardly ever need it. But then, it's reassuring to be able to see BASIC working when it pauses for one of those seemingly interminable string sorts.

In any case, enjoy. Just watching those LEDs is a delight. If there is enough interest, a printed circuit board will be made available for this project. Please write to me at Roxbury, VT 05669. Enclose a self-addressed, stamped envelope.

Reminder: The Edge Connector

I've recommended that you all purchase and read the *TRS-80 Technical Reference Handbook,* which contains the pin assignments of the edge card connector. But just as a yearly reminder, it's presented in Fig. 3.

High-Speed Update: I am still receiving many letters about the speed-up modification which appeared in the February 1980 issue of this magazine. This speed-up works well for all versions of the TRS-80 Model I, but some expansion interfaces (those manufactured since the spring of 1980) may need a few changes. These are the expansion boxes that don't need the buffered cable.

The changes involve the way memory is selected in the expansion box, because these interfaces were fixed to run at 1.77 MHz and no faster. First of all, be sure you have RAMs rated at 300 nS or better, which is usual for newer expansion interfaces.

There are seven steps:

1. Find Z37 and Z38.
2. Cut the trace leading from Z38, pin 9. Call the end furthest from Z38 "loose end A".
3. Cut the trace leading from Z38, pin 8. Call the end furthest from Z38 "loose end B".
4. Cut the trace leading from Z37, pin 4. Call the end furthest from Z37 "loose end C".
5. Attach loose end A to Z38, pin 11.
6. Attach loose end B to Z37, pin 4.
7. Attach loose end C to Z38, pin 9.

With these changes in place, memory will be selected faster and asked to produce valid data from the computer much faster. Technically, the Radio Shack design slowed the Row Address Strobe (RAS) from the computer by a few nanoseconds to produce a special signal for the expansion box, MRAS. By using an inductance network, the design also produced delayed signals which were used for select multiplex (MMUX) and column address strobe (MCAS).

These alterations retain the original RAS, and the delayed MMUX and MCAS follow that. Normal speed on the computer is unaffected by these changes.

Survey Results

Well, the votes have been cast, few of them though there were (23 out of 50,000 readers!), and here are the results:

Everything's okay:	15
More hardware:	3
More software:	3
More of both:	1
Five page complaint:	1

Among all the software presented, only KBEEPFIX is in regular use; two readers built the real-time clock, one the small interface, and two performed a few suggested modifications. To the readers who responded, many thanks. To the 49,997 others. . . where did I go wrong?

Memory Sidecar Update: Apparently, initial shipments of this device from The Peripheral People have been delayed, but should be in your hands by the time you read this. Also, another company has developed an inexpensive ROM add-on, and several utilities to go with it. Write to Computer Accessory Technology, Frank Kwong, 1307 Bagley Dr., Kokomo, Indiana 46901.

Interview with Dr. Lirpa: Thanks and credit were inadvertently omitted last month. Appreciation to *Audio Magazine* for greasing the path to Dr. Lirpa's villa.

Next month (with luck): 384 x192 high-resolution graphics add-on. Plug it in, turn it on.

EDUCATION 80

by Earl R. Savage

I have long maintained that teachers can learn to write instructional programs much easier than programmers can learn to instruct. That's another way of saying it is much easier to make a programmer out of a teacher than a teacher out of a programmer! I don't mean to sell programmers short—it's simply that extensive training and experience are necessary before anyone can become a teacher, and therein lies the problem with much of today's instructional programming.

It is a rare stroke of luck when a programmer turns out a good CAI (Computer Assisted Instruction) program. This is true even when he knows the subject well—he just doesn't know enough about how people learn or the most effective ways to present material to various types of students.

There is a very real shortage of teacher-programmers. When you consider that the best CAI writer is a combination of master teacher and expert programmer, where do you find one?

A second reason for scarcity of good CAI is financial. Writing a good program from scratch requires many hours; to be worthwhile, the writer must be able to anticipate a reasonable number of sales at a fair price. Schools, however, are increasingly short of funds: As they buy less, writers produce less.

The solution is to find some method by which teachers can write programs quickly without knowing anything about programming. Fortunately, such a solution is as close as your mailbox. There are writer's programs available which will take care of all the "computer stuff" and let you concentrate on the learning material.

Instructional Goals

Let's have a quick review of the fundamentals of planning an instructional lesson or topic. This is nothing new—it's the same process you've been using for years when planning instruction. Planning for computer instruction is exactly like planning for regular classroom instruction. The only difference is that it is easier to accomplish some important objectives with CAI.

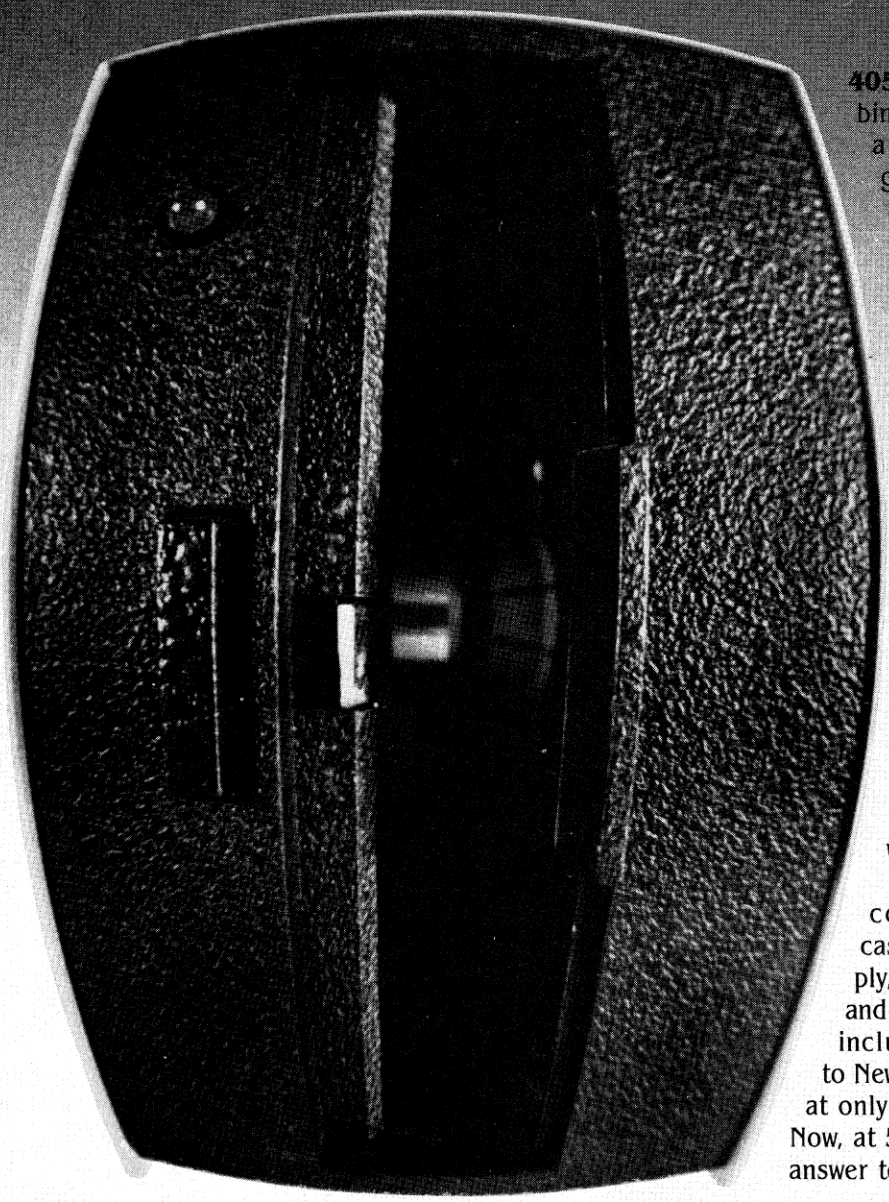
After setting goals and performance objectives for student achievement, select the instructional materials and processes which you expect will lead to attainment of those objectives. From a practical standpoint, you end up with a "plan of attack" (on ignorance) suited to the students, the material and the situation.

CAI Organization

The simplest type of CAI programming is organized in a linear manner. It is similar to the pattern used in the lecture/discussion presentation of material by the classroom teacher. Linear programming is represented by the diagram in Fig. 1.

APPARAT INTRODUCES

Now even more bytes per buck

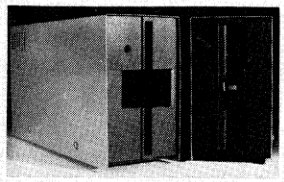


405 K/bytes of storage. Apparat has combined its Newdos/80 operating system and a dual-sided 80 track mini-floppy drive to give you 405,000 bytes of storage in a single volume. Modification patches to Newdos/80 expands the capability of single density drives, so you'll have greater applications for your TRS-80 model 1.®

Drives plug directly into an expansion interface with no modification required so you can now have over 1 megabyte of storage on-line with standard mini-floppy diskettes. Each drive has 316 free grans, for a total of 948, on a maximum of three 80 track drives, which can be added to a TRS-80.

Upgrading to double density is possible by running under most double density controllers, (e.g. Percom's Doubler).

These drives can "read" standard 35 or 40 track diskettes with special software that skips every other track.



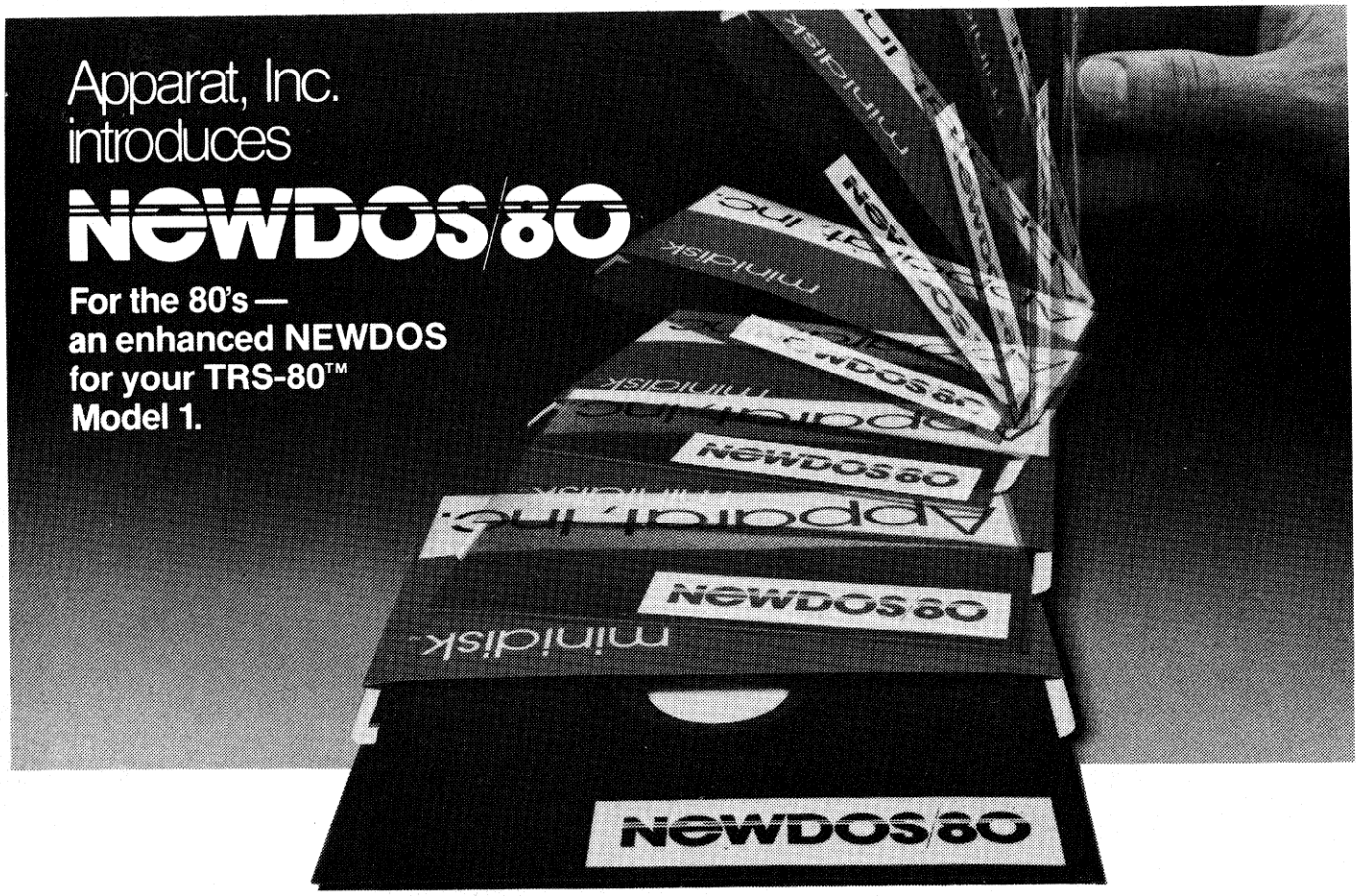
Drives come complete with case, power supply, interface cable and documentation including patches to Newdos/80. The drive mechanism is priced at only $699 (Cat. No. 1-705, specify I or III). Now, at 579 bytes per buck, it just might be the answer to your storage problems.

Toll Free Order Line
1-800-525-7674
(Except CA, AL, HI)
For Technical Service
303-741-1778

Apparat, Inc.
4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

VISA master charge

Now available for model III, 728K bytes of storage.



Apparat, Inc., announces the most powerful Disk Operating System for the TRS-80®. It has been designed for the sophisticated user and professional programmer who demands the ultimate in disk operating systems.

NEWDOS/80 is not meant to replace the present version of NEWDOS 2.1 which satisfies most users, but is a carefully planned upward enhancement, which significantly extends NEWDOS 2.1's capabilities. This new member to the Apparat NEWDOS' family is upward compatible with present NEWDOS 2.1 and is supplied on Diskette, complete with enhanced NEWDOS + utility programs and documentation. Some of the NEWDOS/80 features are:

- New BASIC commands that supports files with variable record lengths up to 4095 Bytes long.
- Mix or match disk drives. Supports any track count from 18 to 80. Use 35, 40 or 77 track 5" mini disks drives or 8" disk drives, or any combination.
- A security boot-up for BASIC or machine code application programs. User never sees "DOS READY" or ">READY" and is unable to "BREAK", clear screen, or issue any direct BASIC statement including "LIST".
- New editing commands that allow program lines to be deleted from one location and moved to another or to allow the duplication of a program line with the deletion of the original.
- Enhanced and improved RENUMBER that allows relocation of subroutines.
- Powerful chaining commands.
- Print Spooler.
- DFG function; simultaneous striking of the D, F and G keys will allow the user to enter a mini-DOS to perform some DOS commands without disturbing the resident program. (e.g. dir while in scripsit.)
- Upward compatible with NEWDOS 2.1 and TRSDOS 2.3.
- Includes machine language Superzap/80 and all Apparat 2.1 utilities.
- Enter debug any time by pressing 123 keys. Also allows disk I/O.
- Diskette "Purge" command.
- Specifiable system options (limited sysgen type commands).
- Increased directory capacity.
- Copy by file commands.

NEWDOS/80 with all of the NEWDOS + utility programs, many of which have been enhanced, is priced at just $149.00 and is available at most TRS-80 dealers.

As with 2.1, NEWDOS/80 relies on the TRSDOS and Disk Basic Reference Manual published by Radio Shack. NEWDOS/80 documentation supports its enhancements and upgrades only.

VISA | master charge

✓ 264

Apparat, Inc.

NOW AVAILABLE FOR MODEL III

TO PURCHASE NEWDOS/80, COMPLETE AND MAIL TO:

Apparat, Inc.
4401 S. Tamarac Parkway
Denver, CO 80237

—OR—

Order Desk
800-525-7674
Technical Service
303-741-1778

☐ Check ☐ Money Order ☐ Master Charge ☐ Visa

Card No. _____ Expiration Date _____

Colo. residents add 6.5% sales tax. Cal. residents add 6% sales tax
Add $10.00 postage and handling for outside North American continent.

Please rush _____ NEWDOS/80 @ $149 EACH TO:

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

0/1A

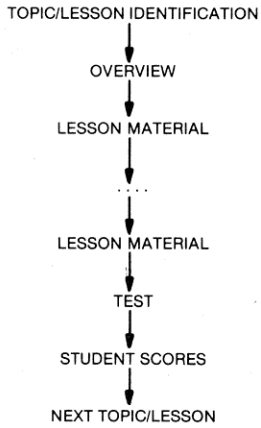


Fig. 1. A Linear Instructional Program

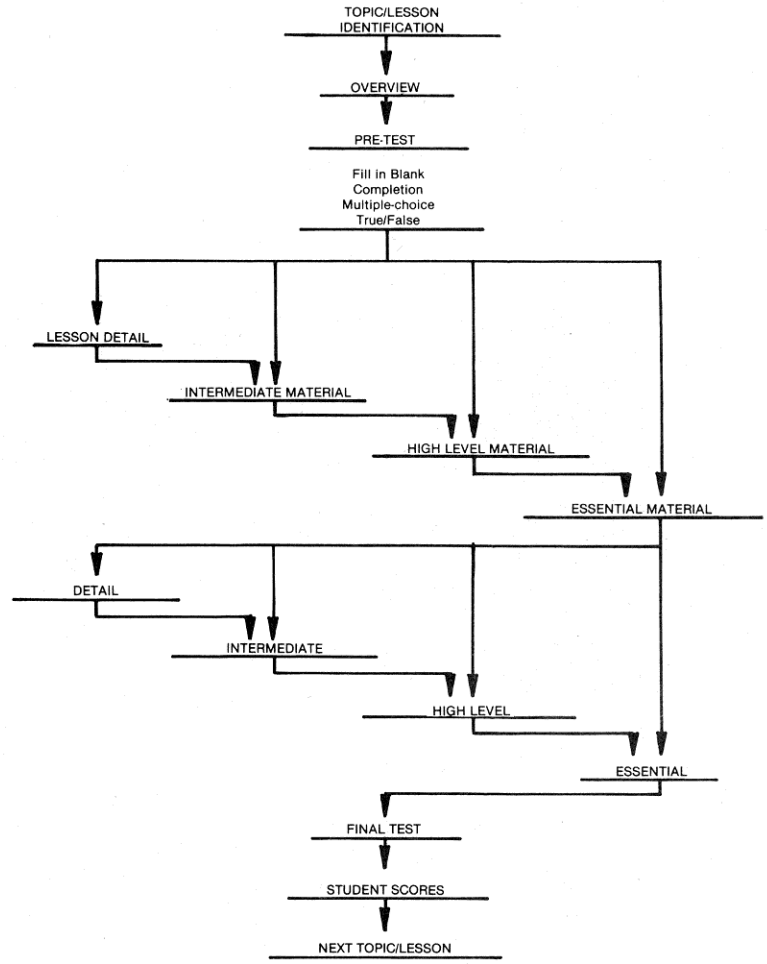


Fig. 2. A Branching Instructional Program

The program (or teacher) presents a series of informational frames which may or may not include a significant amount of student interaction. All students are exposed to the same material in the same sequence.

A more advanced type of CAI programming is called branching. In branching programs, all students are not presented the same material. They get only that which, by some criterion, they seem to need.

Fig. 2 shows one example of an almost infinite variety of branching possibilities. In this case, each student takes a "pretest" and then receives material which is appropriate in detail and scope to his demonstrated knowledge of the subject. A typical branching program contains frames of instructional material which are skipped by students in various categories. There may be as many levels as the teacher believes necessary, though seldom does one find more than four levels in a program.

The better your plans, the better your instruction. We will leave the subject of planning with the well known axiom that an effective instructional activity requires careful planning regardless of the means used to present that activity.

Easy Programmer

So, there you are with your lesson plan in hand, ready to write your CAI program. Even if your plan is linear, you must know something about programming that computer. If it is branching, you must know much more—*unless*. . . unless you have an "author" program to take care of the nuts and bolts of putting your plan into the computer.

Programs called CAIware and Super-CAI will handle those nuts and bolts for you. They are available from Microgrome, Fireside Computing, Inc., 5843 Montgomery Road, Elkridge, MD 21227. As amazing as it may seem, all the teacher has to be able to do is load the author program and follow simple instructions.

CAIware consists of three parts: an author program, a student program and a detailed manual. The author program is a manager-formatter, used by the teacher to create lesson tapes according to his own specifications. The student program is used by the student to call up the lessons. Both programs are re-used as often as desired; they are unchanged by the lesson presentation.

You, the teacher, need know absolutely nothing about programming to create top quality CAI lessons. The author program takes care of that automatically. You simply answer questions and fill in the blanks on pre-formatted screens.

I'm aware that this sounds like a straight-jacket, allowing little variation in lesson format. Nothing could be further from the truth. The CAIware author gives you a large number of choices throughout, allowing you great variety and latitude formatting each lesson to match the requirements of the subject and the needs of the students.

Those of you who are beginning or even advanced programmers should not overlook the value of CAIware and Super-CAI: you should consider the time and effort an author program can save you. If you don't have to slow down to figure out the nuts and bolts for each of your lessons, you can spend more time on the essential planning and end up with more good CAI programs for your students.

Don't wait for someone else to write CAI programs suitable for your students. You have already done most of the work—look at all those lesson plans in your file cabinet! I bet that with a little plan modification and some nuts and bolts assistance, you can be on the way. ■

THE EXCLUSIVE ORACLE

by Dennis Kitsz

Q: I have built your interface (April, May and June "Applications") and it works fine. How about another couple of chips that would decode seven of the data-out pins as a peripheral device's address. Then you could use the eighth address bit as your logic high or low signal. That way, couldn't one port control two to seven devices on or off?

Also, a disturbing thing with the interface so far is that with the ribbon cable connected to either the computer or the expansion interface, I get some kind of noise that appears on letters displayed from the keyboard. Would this disappear if I enclosed it in a metal case? Do I need to shield the ribbon?

Lenny Greenberg
Toledo, OH

A: The idea of controlling peripheral devices that way is a good one that I never considered. There's an old psychology term called "functional fixedness," and lots of us fall into that trap. Using data lines as an address is in that category. So here's part of a circuit you might use:

The 74LS154s select one of 16 devices when given a binary input; the three other lines can select one of eight 154s, giving a total of 128 options. (What are you running, Lenny, all the traffic lights in town?) The on-off signals can be run to the 5-volt relays as shown, or to optical isolators where you are working with higher voltage. (Maybe a train set?)

As for your noise problems, you might consider a shorter cable, braided cable, or shielding, but first check the cleanness of the wiring or soldering on the small interface. Also, if your expansion box does not use the buffered cable, any peripheral devices that connect directly to the edge-card bus increase the overall system noise. Tandy's technical handbook only rates the TRS-80's fan-out (the ability to drive additional circuits) as "one"! So clean the edge-card contacts, keep the TRS-80 away from noisy electrical equipment (fluorescent desk lamps are notorious), and connect peripheral devices only when you need them.

Q: Well, here I am, sitting at the good old TRS-80 using the Word Processor from May's *80 Microcomputing*. Getting the LNW Research Interface up and running has given me a problem. The real-time clock won't work, I have all chips in the board except for the disk controller. Any ideas?

John W. Schrage
Chester, New Jersey

A: Oddly, the disk controller is an integral part of the real-time clock in the LNW board. The chip can be obtained from Advanced Computer Products in Irvine, California, for about $17.

Q: Single-stepping a BASIC program (September "Applications") intrigued me, as it seems to be an excellent way to debug a program. I have a 48K TRS-80 with two disk drives, and use either TRSDOS 2.3 or NEWDOS +. I thought I would give the BASIC version of the single-stepper program a try. I cannot get beyond line 30, at which point my screen reads ILLEGAL FUNCTION CALL AT 30. Could you make some suggestions?

```
30 POKE 16526,228 : POKE 16527,127 : M% = USR(0)
```

Dr. George L. Haller
Naples, FL

A: Your disk operating systems provide you with ten USR options rather than just one we Level II users are allowed. That means you must define the entry points for each of these USR calls. In this case, the line would read:

```
30 DEFUSR1 = &H7FE4 : M% = USR1(0)
```

By the way, since you have a 48K machine, you might wish to relocate the single-stepper to higher memory.

Q: I'm having a lot of trouble with my TRS-80. First, when my computer scrolls, it prints spaces as zeros, Gs as Ws, and so on. It is very regular, and this does not occur until the computer gets to the bottom of the screen and scrolls. The last line is unchanged. Second, the computer is ignoring some cassettes, most of which I've loaded many times successfully. Either I get a stuck asterisk or no asterisk at all. Third, I've been getting some arbitrary characters on the screen, and often the computer will unexpectedly lock up. Other times the screen will fill with garbage and begin printing, from the bottom to the top, a pair of alphabetic or numeric characters. What's happening?

Dave Hildebrandt
Walnut Creek, CA

A: As you know by now, we solved these problems together. Here's what happened. Some solder hairs you left when you put in a lower-case mod were causing part of the random garbage and most of the lockups. Moving the CPU away from some nearby electrical equipment cleared them up completely.

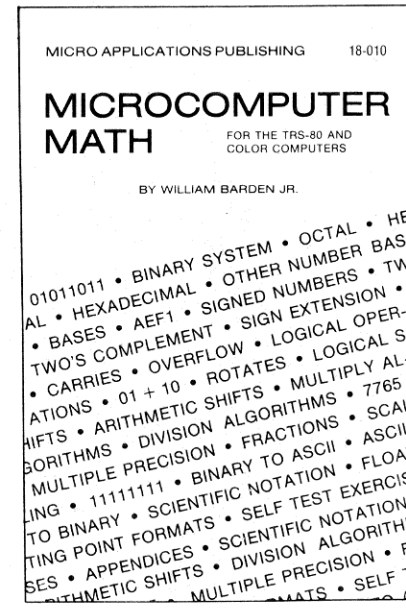
The scrolling problem was more subtle. Bit 4 of the video memory seemed stuck high all the time, which would account for the very regular change in letters. Yet, since the screen data was printed correctly the first time (before scrolling), it

ANOTHER BEST SELLER BY WILLIAM BARDEN JR!

MICROCOMPUTER MATH

FOR THE TRS-80 AND COLOR COMPUTERS

"INDISPENSABLE!"
"A MUST!"
"BARDEN DOES IT AGAIN!"



A GREAT NEW BOOK FOR THE TRS-80 AND COLOR COMPUTERS. EXPLAINS ALL OF THE CONFUSING ASPECTS OF BINARY, HEXADECIMAL, LOGICAL OPERATIONS, FLOATING-POINT & OTHERS. FOR THE BEGINNER AND INTERMEDIATE BASIC AND ASSEMBLY LANGUAGE USER.

An invaluable reference text for TRS-80 Model I, II, III and Color Computer users. Binary Representation • Converting from Binary to Decimal and Back • Hexadecimal • Converting from Hex to Decimal and Back • Signed Numbers • Two's Complement • Carries • Overflow • Flags • ANDs, ORs, Exclusive ORs • Shifting • Multiplication and Division Methods • Multiple Precision • Fractions • ASCII • ASCII Conversions • Floating Point in BASIC • Single & Double Precision •

Written in a humorous, easy-to-read style by the author of Radio Shack's "TRS-80 Assembly Language Programming" and "Programming Techniques for Level II BASIC" and many other books in the microcomputer field. Profusely illustrated with many examples and *self-test exercises.*

AVAILABLE ONLY THROUGH:

MICRO APPLICATIONS PUBLISHING
P.O. BOX 3568
MISSION VIEJO, CA 92692 ✓71

I HAVE A

☐ MODEL I ☐ MODEL II ☐ MODEL III
☐ COLOR COMPUTER

☐ SEND ME _____ COPIES OF "MICROCOMPUTER MATH FOR THE TRS-80 AND COLOR COMPUTERS" at $9.95 EACH. CALIFORNIA RESIDENTS ADD 6% SALES TAX.

NAME _____ STREET _____

CITY, STATE _____ ZIP CODE _____

MAKE CHECK PAYABLE TO MICRO APPLICATIONS PUBLISHING

ALLOW 3 WEEKS FOR DELIVERY

TRS-80 IS A TRADEMARK OF TANDY CORP.

✓See List of Advertisers on page 306

would seem that the video memory itself was fine. What could this mean? We need to know something about the scrolling routine itself, which works like this:

```
LD      HL,3C40H
LD      DE,3C41H
LD      BC,37FH
LDIR
```

In other words, it transfers what it reads from the bottom 15 lines of the screen to the top 15 lines. Simple. But the secret is the statement, "what it reads from." This means bit 4 is fine going into the video RAM, but messing up on the way out. It could indicate a bad read line on the video RAM, a blown buffer, or a broken trace on the line (causing it to "float" high). In your case, the trace was torn during your modifications, and the problems cleared up when the trace was repaired.

Finally, your cassettes load now that you've replaced the ones damaged by your CTR-80 tape recorder. Radio Shack still offers the free fix to early CTR-80s, which could record a glitch onto tapes, even in the play mode.

Q: I am having a great deal of trouble communicating using my CAT modem. It works great with other TRS-80s, and in fact I've exchanged info from Spokane to Chicago. There is a Computerland store in my neighborhood that is left up all night. The employees swear other TRS-80 users are on the system, but I can't seem to get going. Are there any tricks to interfacing a TRS-80 and Apple? Baud rate? Stop bits?

Paul Knechtel
Hinsdale, IL

A: Since you've been successful on line, I won't suggest you've been putting the phone receiver in backwards! I did that myself the first time. Your question is one that plagues computer users from the home user to the systems engineer: what communications protocol to use?

For hobbyist use, you would normally be sending your data at 300 baud, 8 bits, with parity disabled. Use full duplex, and set your modem to the "originate" position. After you dial the number and the host computer answers, you should hear a whine pitched approximately a seventh higher than yours (like the distance between C and B on the piano). When it hears your answer tone, it may send some requesting signal, such as a question mark, but don't count on it. Hit ENTER a few times, and wait. Keep trying that, but if there's still no response, or the carrier tone disappears, dial up again. Go through the same process, but listen in on an extension. Listen for a variation or jitter in the pitch at the far end. It may not be sending data at all, or your local phone lines may be weak. As a last resort, ask for a list of those "other TRS-80 users," and give one of them a call.

There are no tricks to interfacing an Apple and a TRS-80. The reason we use ASCII, standard modem frequencies, and so forth, is to provide compatibility.

Q: I would like to leave the small Radio Shack amplifier/speaker connected to the second cassette cable and not have to do a lot of unplugging, etc., for music and sound effects. Is there a POKE that would direct the output to the second cassette jack?

Joe Sholes
South Boston, MA

A: The switching relay for cassettes in the expansion box is mapped to address 37E4. To switch to cassette #1 (from cassette #0),

```
POKE 14308,1
```

Get back by POKEing a zero into that location. If this doesn't seem to work, check the cables attached to your expansion box. Radio Shack didn't mark their positions, and the order isn't logical. Check the installation manual.

Q: All I want is a routine to have the computer tell me how many digits there are after a decimal point for any given value. My simple program doesn't do the job:

```
10  FOR I = 0 TO S
20  Y = ABS(A – FIX(A))
30  IF Y <=0 THEN 60
40  Y=A*10 : A=Y
50  NEXT
60  PRINT "I=";I:END
```

What's the solution?

Dick Blayney
Mission Viejo, CA

A: There are a few problems that come up when using decimal positions. First of all, single-precision numbers have fifteen. Try this routine, which will work in most cases:

```
10  DEFDBL A
20  INPUT A
30  A$ = STR$(A)
40  B = LEN(A$)
50  FOR X = 1 TO B
60  B$ = MID$(A$,X,1)
70  IF B$ = "." THEN 90 ELSE NEXT X
80  X = X – 1
90  Y = B – X : PRINT Y
100 GOTO 20
```

Defining A as a double-precision number will give you fifteen decimal places before going into scientific notation. Following zeros will not be counted by this program.

Q: There are several things I do not understand about machine language programs written as BASIC POKE statements. For example, in the BASIC single-stepper (September "Applications"), you say key it in and run it separately. Do you mean RUN the program in Listing 2?

When you say delete the program, do you mean delete the program in Listing 2? Is it necessary to protect memory if no other system programs are in memory? And if so should it not be done at power up?

If you say, "always protect memory," I still will not know what you may be trying to communicate. Also, how can an assembly language program be converted to a BASIC listing?

MULTI-USER OASIS HAS THE FEATURES PROS DEMAND. READ WHY.

(THEN COMPARE.)

Computer experts (the pros) usually have big computer experience. That's why when they shop system software for Z80 micros, they look for the big system features they're used to. And that's why they like Multi-User OASIS. You will too.

DATA INTEGRITY: FILE & AUTOMATIC RECORD LOCKING

The biggest challenge for any multi-user system is co-ordinating requests from several users to change the same record at the same time.

Without proper co-ordination, the confusion and problems of inaccurate or even destroyed data can be staggering.

Our File and Automatic Record Locking features solve these problems.

For example: normally all users can view a particular record at the same time. But, if that record is being updated by one user, automatic record locking will deny all other users access to the record until the up-date is completed. So records are always accurate, up-to-date and integrity is assured.

Pros demand file & automatic record locking. OASIS has it.

SYSTEM SECURITY: LOGON, PASSWORD & USER ACCOUNTING

Controlling who gets on your system and what they do once they're on it is the essence of system security.

Without this control, unauthorized users could access your programs and data and do what they like. A frightening prospect isn't it?

And multi-users can multiply the problem.

But with the Logon, Password and Privilege Level features of Multi-User OASIS, a system manager can specify for each user which programs and files may be accessed—and for what purpose.

Security is further enhanced by User Accounting—a feature that lets you keep a history of which user has been logged on, when and for how long.

Pros insist on these security features. OASIS has them.

EFFICIENCY: RE-ENTRANT BASIC

A multi-user system is often not even practical on computers limited to 64K memory.

OASIS Re-entrant BASIC makes it practical.

How?

Because all users use a single run-time BASIC module, to execute their compiled programs, less memory is needed. Even if you have more than 64K, your pay-off is cost saving and more efficient use of all the memory you have available—because it services more users.

Sound like a pro feature? It is. And OASIS has it.

AND LOTS MORE...

Multi-User OASIS supports as many as 16 terminals and can run in as little as 56K memory. Or, with bank switching, as much as 784K.

Multi-Tasking lets each user run more than one job at the same time.

And there's our BASIC—a compiler, interpreter and debugger all in one. An OASIS exclusive.

Still more: Editor; Hard & Floppy Disk Support; Keyed (ISAM), Direct & Sequential Files; Mail-Box; Scheduler; Spooler; all from OASIS.

Our documentation is recognized as some of the best, most extensive, in the industry. And, of course, there's plenty of application software.

Put it all together and it's easy to see why the real pros like OASIS. Join them. Send your order today.

OASIS IS AVAILABLE FOR

SYSTEMS: Altos; Compucorp; Cromemco; Delta Products; Digital Group; Digital Microsystems; Dynabyte; Godbout; IBC; Index; Intersystems; North Star; Onyx; SD Systems; TRS 80 Mod II; Vector Graphic; Vorimex.

CONTROLLERS: Bell Controls; Cameo; Corvus; Konan; Micromation; Micropolis; Tarbell; Teletek; Thinkertoys; X Comp.

Write for complete, free Application Software Directory.

NOW AVAILABLE FOR TRS80 MOD II

PLEASE SEND ME:

Product	Price with Manual	Manual Only
OPERATING SYSTEM (Includes: EXEC Language; File Management; User Accounting; Device Drivers; Print Spooler; General Text Editor; etc.)		
SINGLE-USER	$150	$17.50
MULTI-USER	350	17.50
BASIC COMPILER/ INTERPRETER/DEBUGGER	100	15.00
RE-ENTRANT BASIC COMPILER/INTERPRETER/ DEBUGGER	150	15.00
DEVELOPMENT PACKAGE (Macro Assembler; Linkage Editor; Debugger)	150	25.00
TEXT EDITOR & SCRIPT PROCESSOR	150	15.00
DIAGNOSTIC & CONVERSION UTILITIES (Memory Test; Assembly Language; Converters; File Recovery; Disk Test; File Copy from other OS; etc.)	100	15.00
COMMUNICATIONS PACKAGE (Terminal Emulator; File Send & Receive)	100	15.00
PACKAGE PRICE (All of Above)		
SINGLE-USER	500	60.00
MULTI-USER	850	60.00
FILE SORT	100	15.00
COBOL-ANSI '74	750	35.00

Order OASIS from:

Phase One Systems, Inc.
7700 Edgewater Drive, Suite 830
Oakland, CA 94621
Telephone (415) 562-8085
TWX 910-366-7139

NAME _____
STREET (NO BOX #) _____
CITY _____
STATE _____ ZIP _____

AMOUNT $ _____
(Attach system description; add $3 for shipping; California residents add sales tax)

☐ Check enclosed ☐ VISA
☐ UPS C.O.D. ☐ Mastercharge

Card Number _____
Expiration Date _____
Signature _____

OASIS

MAKES MICROS RUN LIKE MINIS

THE EXCLUSIVE ORACLE

I always see POKE, FOR. . . NEXT, READ, DATA, which can presumably be read by BASIC. Where is it put in a BASIC program? How do I get to it? How do I get back to the BASIC program? I hope my questions are not too much!

George Dosa
Gardena, CA

A: You've asked all the right questions. . . almost enough for a book! There is a key to understanding how these programs work: a computer contains memory, which holds whatever you tell it to hold. When you load a BASIC program, memory holds human-oriented words like PRINT, INPUT, READ, etc., which cannot be used by the computer to do anything. Instead, a large block of permanently programmed memory interprets these words and symbols into the electrical impulses the computer can understand. In this case we call the permanent memory "Level II BASIC."

Machine language programs merely avoid the roundabout and time-consuming process of interpretation. When you load and run a SYSTEM tape, you're avoiding that interpretation process. But remember this: when you load that SYSTEM tape, it doesn't disappear. It is held somewhere in memory, where it can do its work.

TRS-80 users with programs like T-Bug and Editor/Assembler can build their own SYSTEM tapes. You may not have these programs, or you may find it is more convenient to load a single BASIC program with a machine language subroutine. That forces us to use BASIC, clumsy as it can be, to simulate loading a machine language program into memory!

The process is surprisingly arbitrary. To start with, high memory is chosen because Radio Shack lets us set Memory Size, which is the amount of space allocated to a BASIC program. So when program authors tell you to set memory size to 32739, they mean "let BASIC use all the space up to but not including memory cell number 32739." You might think that a short BASIC program wouldn't necessarily need all that memory, would you? Well, the fact is that Level II BASIC always keeps an electronic scratchpad just below that Memory Size boundary. We've got to prevent BASIC from using our machine language program as its scratchpad!

Once space has been set aside in high memory, a FOR-NEXT loop can be created which POKEs the machine language program (READ from the lines of DATA statements) into that reserved block of memory. When the work of POKEing the data is finished, the machine language program is ready to be used; from then on it will be unaffected by any BASIC command because we have protected it. RUN, CLEAR,

Pensadyne

Bringing Word Processing Power to the People

Performance. At a price you can afford. The basis on which our company has built a reputation that spans hundreds of software sales in seven countries.

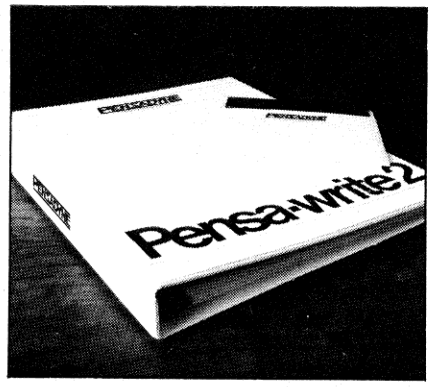
Pensa-write 2 — A new generation word processing system that's flexible, versatile, lightning quick, and includes system features unparalleled in the industry.

— In memory capacity of 19,199 characters in a 32K machine.

— full editing capabilities including; global search and replace, fully controlled transparent cursor, insert and delete functions, keyword searches, non-printing comments, forward and backward scrolling, complete word wrap-around and much more...

— user orientation features included on screen such as time and date, program location, current free memory space, words in memory, and the amount of free disk space.

— directories for all drives available on screen without exit to DOS.



— sophisticated program structure that will allow the addition of program modules that will enhance the editor, your initial purchase will include editor and general purpose printing program. Enhancement modules will include mailing list, basic file editor, report printer, letter printer and others, and will have prices ranging from $39.95 to $79.95. You may also write your own programs which you may integrate with the processor. Up to 20 commands may be specified.

But there's more. Pensadyne computer services believes that after sales service is vital to the full implementation and support of our programs. Should a problem arise with one of our programs, we have a 24 hour service department where you can call and get your questions answered. We guarantee it. In writing. We want you to like what we do for you, because if you do, then you'll come back again in the future. The price of the Pensa-write 2 word processing system. Just **$79.95**. Manual $10.00 (deductable).

Pensadyne. Giving you the power to think.

Send cheque, money order or order by phone, 24 hours, 7 days a week. Mastercharge and Visa cards welcome.

PENSADYNE ✓207
COMPUTER SERVICES

4441 WEST FIRST AVE. VANCOUVER, B.C., V6R 4H9 604-224-3107

NEW, and all the rest leave it untouched.

Consequently, DELETE also leaves the machine language program untouched. Once the work of the FOR-NEXT, READ, DATA and POKE lines has been completed, they are no longer necessary. They may be removed from the program (they need not be, but a long BASIC program might need the space when it executes).

On to your last question: how is a machine language program converted to BASIC statements, and how do you use it? The process is not complicated, but you can run into trouble. First of all, it's best to try to convert only those programs which are intended to work with BASIC, but for which the author has neglected to provide a BASIC version.

Next you must determine three things: where the program starts, where the program ends, and where it is entered. The starting point is usually marked ORG (origin) in an assembly language program. In a hex dump, it is the address presented at the upper left in the block of hex numbers.

Finding the ending point can be a bit tricky. In an assembly language listing, the last address presented is the location of the start of the final machine language instruction . . . which may or may not be the last byte of the program. Since that final instruction might be one, two, three, or four bytes long, look at the listing carefully.

The start and end points thus represent the two bounds of your BASIC FOR-NEXT loop. Naturally, you will have to convert the boundary information to decimal; check back issues of *80 Microcomputing* to learn how to accomplish this task. The machine language program you will be converting is then found either in the block-memory dump or the second column of the assembly listing. Each of the two-character hex bytes must be converted to decimal; these become the long list of DATA statements that are POKEd into place in the above FOR-NEXT loop.

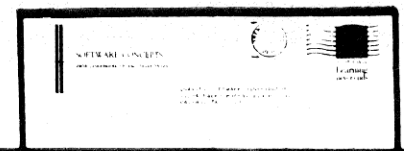
Finally, the entry address must be found and put into place. The entry point is usually described in a program's accompanying text, or will be notated as an END statement in an assembly listing. An address is two bytes long, so it can't be squeezed into a single POKE. Instead, the address is split into two halves, and each of those converted to decimal. For example:

```
7F00 is split into 7F 00
7F and 00 are converted to decimal 127 and 0
```

These values are POKEd into the USR entry locations, 16527 and 16526. The high byte (7F or 127 in this case) goes into 16527, and the low byte into 16526. Whenever a statement containing USR is executed (M% = USR(0)) or PRINTUSR(5), for example), the BASIC program jumps to the machine language program. If the program has been well written, it will automatically come back to BASIC when it is finished.

George, there are many ways of making machine language programs work with BASIC. Some use fancy tricks, but this is the most direct. Good luck. ■

Address your questions about the TRS-80 to Dennis Kitsz, Roxbury, Vermont 05669.



SPECIAL DELIVERY

WORDPROCESSING
- POWER -
for the TRS-80®

"...If you're presently looking for a mailing list processor, this represents the current state of the art."
80 MICROCOMPUTING - 80 REVIEWS - JULY 1980

MAILFORM is data entry at its best, just fill in the form! FAST, EASY to use functions include: search, sort, extract, page forward and back. 'Transparent cursor', insert/delete characters, and MORE!

MAILRITE prints 'personalized' form letters by inserting information from MAILFORM into Electric Pencil®, Scripsit®, or BASIC text files. Print letters, labels, even envelopes! Boldface, underscore, change margins, pause, print 'unprintable' characters, and MORE!

XTRA! includes: MAILFORM; MAILRITE - with capability of printing variable text from a 'key' file; MAILABEL - 1, 2, 3, or 4 across label printer; and MAILSORT - sort a full 40 track double density data diskette in only 48K!

ALL MACHINE LANGUAGE
means unsurpased
SPEED, RELIABILITY & EASE OF USE

For VISA, Master Card & COD orders only
Call NOW - TOLLFREE
(800) 824-7888
ASK FOR OPERATOR 203
California (800) 852-7777
Hawaii & Alaska (800) 824-7919
For more information call (214) 233-3998
(Requires min 32K single disk drive)

FOR THE MODEL I & III
SPECIAL DELIVERY $125
XTRA SPECIAL DELIVERY .. $199
FOR THE MODEL II
SPECIAL DELIVERY $199
(Requires Mod II DOS version 2.0)
TRS-80 is a registered trademark of Tandy Corp.

VISA MasterCard

software concepts
13534 Preston Rd. Suite 142
Dallas, Texas 75240
Visit us at the San Francisco Computer Faire April 3-5
Dealer Inquiries invited ✓299

✓See List of Advertisers on page 306

80 NEWS

edited by Bert Latamore

"Three major files of the Dow Jones Information service have been reformatted for compatibility with all TRS-80s."

Dow Jones Offers Videotex Tie-In

Up to the second business news and continuously updated stock quotes can now come directly from Dow Jones to you through your TRS-80 or Videotex.

Under an agreement with Tandy, the nation's largest publisher of business news is making three data bases of its electronic news service, the Dow Jones Information Service, available for all models of the TRS-80, including the new color computer and the Videotex monitor.

For Dow this represents a major step in making the Dow Jones Information Service, originally designed for brokers, securities analists and others in the financial field, available to the general public.

For Tandy it is a second major step in a move to make the TRS-80 a major source of news and information, a process which saw its first success in the introduction of the Compuserve service to the TRS-80.

Dow is so confident it is making available a free hour to all present owners and purchasers of Videotex.

Direct Pipeline

Dow has reason for its confidence. The package gives what is in many ways an investor's and businessman's dream, a pipeline directly into the heart of Dow Jones, publishers of *The Wall Street Journal* and *Barron's National Business and Financial Weekly*.

Three major files of the Dow Jones Information Service have been reformatted for compatibility with all TRS-80s. The first contains most items on the Dow Jones News Service, the nation's largest business news wire service, from 90 seconds ago to 90 days ago.

The second is a constantly updated listing of stock quotes for more than 6,000 businesses from the New York, American, Midwest and Pacific stock exchanges and the NASDAQ over-the-counter market.

The third is a file of detailed financial statistics on the 3,200 companies.

All these are arranged for access by company or by 60 subjects areas so you can see what is happening with any particular firm or get a view of overall activity in a particular market.

News stories hit the electronic news service 90 seconds after they go over the Dow wire, according to Tim L. Turner, director of marketing information services for Dow.

For instance, Turner said, two minutes after the story on the Dow-Tandy agreement was announced over the Dow Jones wire he read the story off his computer terminal.

That day Tandy stock rose several points, a clear demonstrations of just how sensitive today's market is to such news.

Because of the speed of the service, a TRS-80/Videotex user is essentially reading over the shoulders of the reporters and editors of the *Wall Street Journal* as they write tomorrow's front page.

The news wire maintains a record of stories for 90 days, so you don't read a story in a vacuum. Instead, you can review what has happened to this company and its industry by summoning a menu of headlines by firm or subject area and scanning them to find stories that relate to your present interest.

The stock quotation files are delayed 15 minutes because of rules imposed by the stock exchanges. The 80/Videotex user can get these by company or subject area and can specify from which exchange he wants the quote.

He can also get the full financial picture of any of 3,200 firms in the Dow list. This file is updated weekly.

Early Electronic Publishers

Turner said Dow started electronic publishing in 1974 as a service for professionals in the investment field.

In 1977 they started a time-sharing service on a dial-up basis, but it wasn't until 1978 that they tried marketing it to the general public through the Apple microcomputer.

By means of the agreement with Tandy, which, sells more than 50 percent of the total microcomputers sold in the United States and Canada, Dow is trying to reach a much larger market with services that have proven to be popular, Turner said.

Tandy spokesman John Shirley, on the other hand, said Tandy's interest in the non-exclusive agreement is to make a new

Journal Not Going Electronic

The publishers of the prestigious business press, *The Wall Street Journal* and *Barron's* among others have joined a growing number of newpapers entering electronic publishing.

Dow Jones Spokesman Tim L. Turner said Dow's recent agreement with Tandy Corporation which puts the Dow Jones Information Service on Videotex is a move to make the service more available to the general investing public.

This public will be able to read many *Wall Street Journal* stories over their TRS-80s before *The Journal*, itself, can print them.

However, Turner said Dow Jones does not expect this to have a major impact on *The Journal's* circulation. He said Dow has no plans to turn *The Wall Street Journal* into an electronic newspaper.

Rather, he said, the two news services are seen as serving different, although complementary, needs.

"People use the electronic service and still like to read *The Journal*," he said. ■

and unique information service available to owners of TRS-80s.

Tandy-Radio Shack is basically a hardware producer in this area, he said. The firm hopes to promote its microcomputers and Videotex terminals by making their service more valuable.

Turner said the Videotex version of the Dow service is intended mostly for the small businessman who uses a microcomputer and for the individual investor.

He said in many cases the costs involved are tax deductable, and he said that the service is low cost.

The Dow service is compatible with the Videotex without any change in hardware. The major change to the three databases involved fitting them to the 32 characters across format on the Color Computer.

"A TRS-80/Videotex use is essentially reading over the shoulders of the reporters . . . of the Wall Street Journal."

Instructions and Costs

All the investor needs is the instruction books and his password. The books and a special password good for an evening hour's free time on the service are being included in the $29 Videotex package. Passwords and instructions are to be made available to those already owning Videotex at no cost.

To use the system, you simply call your nearest Tymnet telephone number. Several pages of these numbers, covering cities across the US and Canada ranging from Los Angeles to Moose Jaw, Saskatchewan, are listed in the Dow instructions. For most users the wire service is a local call.

You identify yourself, your equipment and the information you want by a series of codes detailed in the instructions and by a password.

The instructions contain all the codes you need including more than 100 pages of codes for individual firms, mutual funds, private and government bonds and foreign bonds.

The service is being offered to the general public at a different rate than that given to major investment firms. The $2.50 minimum charge those firms must pay has also been dropped.

The cost of the service depends on the database used and the time of day. Costs for non-prime time use, after 8 pm local time at the locale of the user, is much lower than prime time use except for the statistical and financial information, which costs a dollar a minute at all times.

The news service costs a dollar a minute during prime time and 20 cents a minute after 8 pm. Stock quotations cost 75 cents a minute during prime time and 15 cents at night. The cost of the Tymnet telephone system is included in these charges.

There is no start-up charge or minimum charge imposed, Turner said.

The service is available on weekdays from 6 am to 3 am EST daily. On holidays and weekends, which count as non-prime time all day, the system operates from 7 am to 3 pm EST, Turner said.

Dow does not charge extra for the privilege of making private copies of any information available in the databases, so you can store or print anything that interests you.

Turner said the costs, which may appear high at first glance, are actually very reasonable for the kind of service Dow is offering when compared to other electronic news services such as Compuserve or The Source.

This, he said, is because these other services are not designed to give you information by company or by stock or by business subject. To get such information from these sources you have to spend a great deal of time searching for it, and since the cost of the information is your search time, times the rate per minute, the charges increase.

Even at that, some of the information, such as the most recent market quotes, may not be available from the other services at all, he said.

"As you read this, someone may well be checking his stock portfolio from his study or office over his TRS-80."

As of press time the service was nearly ready for release to the general public. The only holdup seemed to be final printing of the special users guide for owners of TRS-80s and distribution of the guide to Radio Shack stores.

Officially both firms have promised the service to be available sometime in the "second quarter." Turner said he expected it to be available this month. So, as you read this, someone may well be checking his stock portfolio from his study or office over his TRS-80. ■

Bert Latamore
80 Staff

Coleco Patents Football Game, Seeks Court Block against Tandy

Coleco Industries, Hartford, CT, recently granted a patent on their hand-held version of electronic football, is now instigating suits for infringement against Tandy-Radio Shack Corporation, Fort Worth, TX; Mattel, Inc., New York, NY; and several other electronic game manufacturers and distributors.

Coleco's attorney, Michael Schwefel, said the suit is a straightforward action and does not set a precedent in the area of protecting software. He said the Coleco patent is for a physical device, not for a program.

Coleco is seeking an order stopping the game companies from what it says is an infringement of its patent and is seeking monetary damages based on a percentage of the total sales of football games by each offending firm. He said he did not know the exact amount sought against Tandy-Radio Shack.

Coleco maintains that aspects of its game allowing passing and blocking and allowing two people to play it interactively are being infringed on by other products in the field.

Schwefel said, however, that Coleco's patent does not prevent other firms from producing electronic football games.

This is not the first patent for an electronic game to be granted, Schwefel said. In fact Coleco is suing Mattel over a previous patent Mattel holds, arguing that that patent is invalid.

Attorney Gary Pat of Tandy's legal office declined to comment of the suit beyond acknowledging that Tandy-Radio Shack was named as a defendant. ■

Students to Work for Computer

Elementary school children across the country will have the opportunity to do something to improve their own educational opportunities this fall thanks to a link-up between Tandy Corp. and the QSP division of Readers Digest.

Under the new agreement children will sell magazine subscriptions to their parents to earn credits their school can use to buy TRS-80 hard and software.

"If I could dream up 12 good programs like this today, we'd put them into effect tonight."

QSP, Inc., Vice President William E. Drake emphasized that children would not be selling door-to-door and that the list of more than 300 magazines QSP offered would all be in "good taste."

"We aren't selling *Playboy* or *Hustler*," he said.

The sales effort will be sponsored locally by PTAs or similar groups, Drake said. The school systems who go for the program will distribute QSP literature and subscription forms to the students' homes through the children.

Credits for Hardware

QSP would return 50 percent of the gross magazine sales to the schools in the form of credits which could be used to buy any TRS-80 hardware or educational software at a discount.

"Basically, we're hoping the parents will buy their magazines through us instead of from someone else," Drake said.

Charles Phillips, vice president for special markets for Tandy, called the program "a dynamite idea.

"These people (QSP) have been in the business a long time, and they recognize the interest schools have in computers and the funding problems many schools have," he said.

Phillips said the program was not targeted at any particular portion of the educational market but was "another way for schools to get computers."

He said he hears daily from school systems who are interested in putting TRS-80s in their classrooms but lack the necessary funds.

"The schools are hard pressed," he said. "We have no way to help them find funds."

Drake said this was a general marketing program not connected to Tandy's educational department.

"We're always open to marketing opportunities," he said. "If I could dream up 12 good programs like this today, we'd put them into effect tonight."

Phillips said Radio Shack was giving the program "a standard volume discount" on products, but declined to give specific figures. They were determined in an agreement signed between Tandy and QSP.

Drake, however, indicated the discounts were substantial. Asked how many magazine sales a school would need to earn one computer, he said it would take about $1,200 in gross sales or about 120 subscriptions.

This would price the computer at about $480 in sales credits.

"Basically, we're hoping the parents will buy. . . from us."

Pilot Program

Drake said a pilot program was starting now in the midwest but that the "big roll out won't be until next fall."

QSP is the largest fund raising magazine subscription sales organization in the country and often works with middle school and high school students earning funds for class trips and other projects through magazine sales.

Both Drake and Phillips said the QSP agreement does not involve any other division of Readers Digest, and both specifically denied any involvement between Tandy and "The Source," A Readers Digest division that distributes information via a computer network to microcomputers.

However, Phillips said the present agreement came out of a meeting between himself and representatives of eight Readers Digest Divisions.

"They have a big educational department, also, which was our main interest in that meeting, I think," he said.

Readers Digest also has been involved heavily in market research for a variety of corporations for many years and has maintained a large installation of mainframe computers for this and other business and financial research for more than a decade. ■

by Bert Latamore
80 Staff

Tandy Sues Personal Micro, Alleges Patent Infringements

Tandy-Radio Shack Corporation, Fort Worth, TX, is suing a rival microcomputer hardware distributor for patent infringement.

The suit, against Personal Microcomputers of Mountain View, CA., and five manufacturing and distributing firms, alleges the input/output programming of the PMC-80 microcomputer is copied from the TRS-80 and that the PMC name is confusingly similar to the TRS-80 registered trademark owned by Tandy.

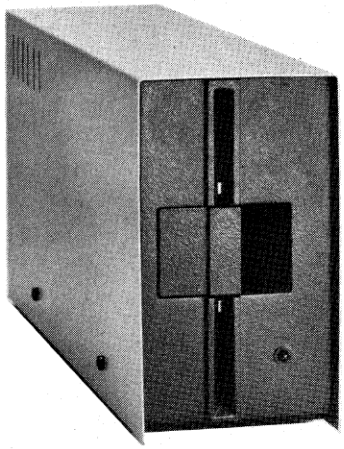
Tandy is asking for unspecified damages and permanent injunctions against Personal Microcomputers, Eaca Electronics Corp. of America, Compumart, Consumer Computers Mailorder and Robitaille & Sons Enterprises, Inc. (The Software Exchange), and the Hong Kong based Eaca International Ltd., apparently the manufacturer of the product.

The PMC-80 is also being sold in Europe, and Australia under the names Video Genie and TRZ-80.

The PMC-80 is fully compatible with virtually all software designed for the TRS-80.

Officials for both Tandy and Personal Microcomputers declined to comment on the suit, which is entered in U.S. District Court in San Francisco, CA, although the spokeswoman for Personal Microcomputers said a statement might be released soon. ■

Mini-Disk Storage Systems for TRS-80* Computers



Access... Offers More. Charges less.

from $295

Check this line-by-line comparison of Access 5-inch mini-disk systems for Model I and Model III computers. *Nobody* offers more benefits, better service or lower prices.

TOLL-FREE ORDER NO.
1-800-527-4196†
(orders and literature only)

Company/Drive Model	Price 1/	Flippy	*Formatted* Diskette Storage Capacity Dbl-Density	Sgl-Density	100% Tested	48 hr. Burn-In	Warranty	Trial Period
40-TRACK DRIVES								
Access Unlimited								
AFD-100†	$295.00	no	180 Kbytes	102 Kbytes	yes	yes	yes	yes
AFD-100F†	329.00	yes	360 Kbytes	204 Kbytes	yes	yes	yes	yes
MTI TF-5	359.00	no	?	?	?	?	?	no
Midwest Comp. & Per. MPI/B-51	321.00	no	?	102 Kbytes	?	?	yes	no
Aerocomp Mdl 40-1	349.95	yes	?	?	yes	?	yes	yes
CPU Shop CCI-100	314.00	no	?	102 Kbytes	?	?	yes	no
AMI 40-track	325.00	no	?	?	?	?	?	no
80-TRACK DRIVES								
Access Unlimited								
AFD-200†	429.95	no	368 Kbytes	205 Kbytes	yes	yes	yes	yes
AFD-200F†	449.95	yes	736 Kbytes	410 Kbytes	yes	yes	yes	yes
MTI TF-8	639.00	no	?	200 Kbytes	?	?	?	no
Aerocomp 80-tk mdl	459.95	yes	?	?	yes	?	yes	yes
CPU Shop CCI-280	429.00	no	?	204 Kbytes	?	?	yes	no
AMI 80-track	560.00	no	?	?	?	?	?	no

1 As advertised in 80 Microcomputing, Jan. 1981.

Free trial offer

Use your brand new AFD drive system for up to 15 days. If you're not *completely* satisfied, pack it in the original shipping container and send it back to Access. We'll refund the price of the system (less shipping charges), no questions asked. (No refund for misuse or improper handling.)

Operating burn-in test — too

Every drive that leaves Access is not only 100% electrically tested and double-checked for mechanical alignment, but it is also given a full 48-hour operating burn-in test. You'll find a test list — checked and signed by one of our competent technicians — in the drive carton. If a drive has latent defects, the burn-in life test will weed them out. The drives we ship just keep on running. And running. And running.

About our warranty

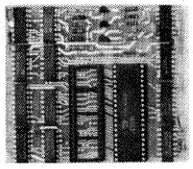
Venus de Milo has about the right number of fingers to count our warranty returns. Nevertheless, your new drive system is covered by our comprehensive 90-day limited warranty. The details are spelled out in the illustrated users manual included with each AFD drive system.

Software galore!

Games. Business programs. System software. We sell many of the best TRS-80* Model I and Model III programs, and at competitive prices. Make Access Unlimited your one-stop shopping center for all of your TRS-80* software, hardware and accessories. Save big! Call our toll-free order number, 1-800-527-4196† for free descriptive literature.

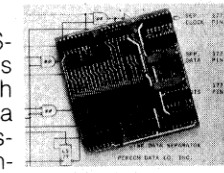
USE YOUR CREDIT CARD AND SAVE! VISA AND MASTER CARD CHARGES ARE NOT DEPOSITED UNTIL THE DAY YOUR ORDER IS SHIPPED. CALL NOW TOLL-FREE, 1-800-527-4196†.

the DOUBLER™



Percom's new plug-in adapter for your Expansion Interface stores almost twice the data on a diskette track as a single-density system. You can store up to four times more data — depending on the type of drive — on one side of a diskette than you can store using a standard Model I mini-disk drive. Other features: Reads, writes and formats *either* single or double density minidiskettes. • Runs TRSDOS*, NEWDOS+‡ Percom OS-80™ or other single-density software *without* changing either software or hardware. Switch to double-density when convenient. • Includes DBLDOS™, a TRSDOS* compatible double-density operating system. • Includes on card, high-performance data separator circuit. • Installs *without* rewiring or trace cutting. • Introductory price, including DBLDOS and format conversion utility, only $219.95. ▶ *Permits Model III* software to be read on Model I computers. ◀

DATA SEPARATOR™



This PC board plug-in adapter for the TRS-80* virtually eliminates data read errors (CRC error — Track locked out!) which occur on high-density inner disk tracks, a problem that has plagued TRS-80* systems. The Percom Data Separator™ is installed in the Expansion Interface without modifying the host system. Caution: Opening the TRS-80* Expansion Interface may void the limited 90-day warranty: $29.95.

Disk System Interconnecting Cables

Improvement over RS cable design places drive 0, which includes the cable termination, at the end of the cable to eliminate the reflected noise of an unterminated cable. Better data integrity. Prices:

Two-Drive Cable $24.95
Four-Drive Cable 34.95

Power Line Filter

115/250 V, 50-400 Hz. Instructions included for easy installation in standard mini-box chassis: $19.95

Minidiskettes (Double-Density rated)

10 Disks in a convenient plastic organizer box $34.90
Single Disk 3.49

Disk Drive ID Tabs

1" x 1¼" self-adhering plastic drive identification tabs. Compatible silver with engraved black drive number. Two tabs (Nos. 0, 1): $2.50; three tabs (Nos. 0, 1, 2): $3.25; four tabs (0, 1, 2, 3): $4.50.

How to Order Order by calling Access Unlimited toll-free on 1-800-527-4196†. Mail orders also accepted. Orders may be charged to a VISA or MasterCard account or paid by a cashier's check, certified check or money order. We accept COD orders with 25% deposit. Sorry, we cannot accept personal checks. We pay shipping and insurance charges on orders over $1,000.00. Add approximate insurance and shipping charges for under $1,000.00. If in doubt about these charges, ask when you call in your order. Texas residents include 5% sales tax. Minimum order $20.00. Allow 2 to 4 weeks for delivery. †Texas residents call (214) 494-0206.

ACCESS UNLIMITED ✓229

315 N. Shiloh · Ste. D1 · Garland, TX 75042
(214) 494-0206

T trademark of Access Unlimited Company. *RADIO SHACK and TRS-80 are trademarks of Tandy Corporation. ™trademark of Percom Data Company, Inc. ‡trademark of Apparat Corporation.
ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE AND ALL OFFERS SUBJECT TO WITHDRAWAL WITHOUT NOTICE.

Author to Make New Microcomputer

In a change-of-state typical of today's micro industry entrepreneur, author/publisher Adam Osborne has become a computer hardware manufacturer. His metamorphosis has resulted in the Osborne Computer Corporation, headquartered in Hayward, CA.

Osborne will manufacture a portable, Z-80A based microcomputer called, predictably, the Osborne 1. The unit will sell for approximately $1600.

This single board midget micro conforms to airline carry-on baggage requirements and weighs only 28 pounds, including monitor. It offers a fast Z-80A processor from Zilog, 60K bytes of usable RAM, both IEEE-488 and RS-232 interfaces, modem electronics and a CP/M operating system. Two single density, 5¼-inch onboard drives are standard and double density drives usable with double sided disks optional.

A five-inch monitor with a 24-line by 50-character display format is also standard. A nine-inch monitor is optional. The character set of the Osborne 1 supports both upper and lower case as well as character underlining. The video display uses 4K bytes of RAM.

Author Osborn has not ventured into hardware manufacturing totally on his own. His corporate board of directors is made up of industry veterans, who have bought into the action. They include: Jack Melchor, a venture capitalist; Gary Kindall, designer of CP/M; Gordon Eubanks, designer of CBASIC; and Seymore Rubenstein, designer of Wordstar.

It is no coincidence that the above products are included in the Osborn 1 package. At the time of purchase the machine is supplied with a CP/M operating system, CBASIC, a Wordstar word processing program and two business programs, Mail Merge and a spread sheet program similar to Visicalc.

No In-House Programming

At present, software support for the Osborne 1 is limited to the programs supplied. Osborne Computer has no in-house programming staff and no plans to create one. Additional software support is expected from outside vendors who will be encouraged to write for the Osborne 1 system by an incentive program, the details of which were not available at press time.

In an interview with *80 Microcomputing*, Barbara Burdick, a marketing representative for Osborne Computer, indicated that several authors were already in touch with the company in hopes of writing software for the machine. In her opinion there will soon be no shortage of software.

Burdick was reluctant to comment on other aspects of the operation, however. When asked about the physical plant, she would say only that the final assembly is performed at the Hayward facility. Component level construction and chassis wiring may take place elsewhere, possibly the far east. When asked how many employees the facility had, she offered, "no comment," as she did when queried about the projected first year production run. She did say that McGraw-Hill, owners of Osborne's publishing operation, was not involved in the hardware venture.

The Osborne 1 will be required to meet the new RFI specifications the Federal Communication Commission has adopted for all microcomputing devices. Since it is being marketed for business environments, however, it will fall under class A limits for power-line conducted and radiated emissions. Certification is expected by mid-April.

While not an immediate threat to Radio Shack, the Osborne 1 microcomputer will have a measurable impact on the Shack's market. It is a carefully thought out machine that brings a level of sophistication to the micro marketplace that is unavailable from other manufacturers in the under $2000 price range.

But will the software, essential to its success be written in time to ensure the survival of the Osborne 1, or, like the Onyx, Sharp and Texas Instruments machines, will it fall victim to software starvation?

by Chris Brown
80 Staff

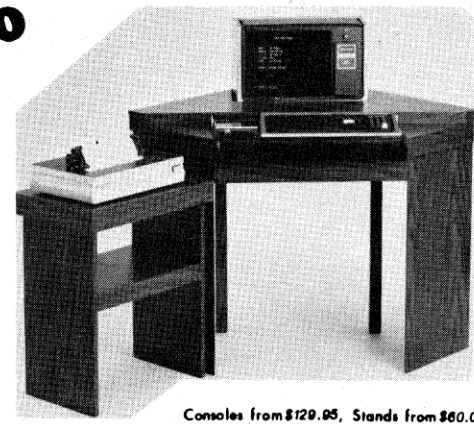
HOMES for TRS-80

(Custom furniture for MODELS I, II, and III)

Homes for TRS-80, is the unique custom furniture line that converts the Radio Shack modular computer system into one homogenious unit. Available in a high quality, commercial and economy series, the basic custom corner desk consoles provide total built-in capabilities for the TRS-80 keyboard, interface, monitor, and cassette. Options are available for building in accessories such as: Stringy Floppy's, Disk Drives, Screen Printers, and Line Printers.

FEATURES

One Homogeneous Unit
Built-in Accessories
Arm Rest Cushion
Copy Shelf
Typewriter Height



Consoles from $129.95, Stands from $60.00

AVS AUDIO - VIDEO SYSTEMS ✓146

2485 Autumnvale Dr. San Jose, CA. 95132

— FOR 24 HOUR INFORMATION —
PHONE 408-946-1265

SSM SOFT SECTOR MARKETING, INCORPORATED ✓495

& Victor Andrews

present

Quality Products That Will Make A Believer Out Of You!

PMC-80/ MODEL I

MISSILE ATTACK
By the Cornsoft Group. New for the PMC-80. This program is a machine language imitation of the arcade game called Missile Command. This real-time machine language game (with sound effects) pits your twin silos of ABM's against a barrage of enemy missiles trying to destroy your cities. As your skill increases so does the difficulty of this ever popular arcade game! Watch the skies and may your aim be true. TRS or PMC-80,
cassette, 16K **$14.95**
TRS, disk, 32K **$20.95**

TAPE COPY 1
©1981 S.S.M., Inc. New for the PMC-80. This program solves the problems that have plagued all PMC-80 owners. ***Problem:*** A machine language program will not load in the cassette player provided in the machine and you can't load a machine language program on the second cassette port. ***This is a problem no more!:*** This program will load a machine language program from the second cassette player and saves it to the built-in cassette player. Loads and saves most TRS-80 readable tapes that load at 500 baud (the standard speed). MOD I or PMC-80.
Cassette ..... only **$14.95**

CONQUEST
©1981 by Lake Front Software. This program is based on the popular board game called **"Risk"** (The names have been changed to protect the innocent.) This game is for one or more people. It is a game that demands attack strategy and, if yours is the best, you will be the 'Lord and Master' of the planet. MOD I, III or PMC-80. Requires 16 K memory, cassette **$14.95**

FLIPPY - Ver. 1.3
©1981 by J. Limkemann. This is a machine language program that plays "the best game of Othello on the TRS-80 that I have seen, and I play a lot of Othello" (Victor Andrews) MOD I or III. Requires 16K memory.
Cassette **$14.95**

COLOR

ANIMATED HANGMAN
Color. ©1981 S.S.M., Inc. This outstanding new program will thrill you for hours. He moves, groans and makes sounds. 16K.
..... **$12.95**

DISASSEMBLER
Color. ©1981 S.S.M., Inc. This program displays hex on left side of screen and ASCII on right side of screen. For screen or printer. 16K. **$14.95**

Just because I can sell something is not a reason for a product to appear in my ad; I must believe in it myself.

The following pages contain new items that I believe in. I am not after only one sale; I want return business, and that means I must give you quality products every time.

I believe I sell only quality products. If you have a problem, send your comments addressed to me. We support every product we sell.

Victor Andrews

MODEL III/ BOOK

MOD III ROM COMMENTED
For the programmer that needs those answers about the MOD III ROM . . . Now! This is a complete list of locations in MOD III ROM and comments on each. All 14K of the ROM. There is no other book that gives you the detail this book has. Don't miss it. In order to respect Tandy's copyright the actual disassembled code is not printed, but the book is in a 3 ring binder format so you can put your own listing in between the pages for easy reading.
..... only **$22.50**

MODEL III

TAPE COPY 2
New for the TRS MOD III. This program will load most TRS-80, 500 baud system tapes (standard MOD I speed) into memory then save it at 1500 baud on the MOD III. No knowledge of machine language needed. Now a way to backup programs that load at the slower speed. Makes cassette loading on your new MOD III a much faster and more reliable process. MOD III only, cassette **$14.95**

MODEL I

TRS SUPER INVADERS
©1980 S.S.M., Inc. The closest TRS version of "Space Invaders" arcade game. MOD I with mono sound,
Cassette **$19.95**
MOD I with stereo sound, disk only **$24.95**

HYRES
©1981 by D. Lewandowski. This is a patch program for the programs called: Invaders Plus and TRS Super Invaders; so they can be run on the Programma Graphix-80 board. MOD I, cassette programs only **$9.95**

CHAIN MAKER
© 1981 Steve Skindell. This program makes writing chain files on NEWDOS-80 a breeze. This is not only a program that creates chain files but it also is an editor of the file. A file can be removed from the disk and edited and saved back to the disk quick and easy. An outstanding program and a must for every NEWDOS-80 owner. Comes with complete easy to read manual. Purchaser must own NEWDOS-80 ..... **$14.95**

BUG +
Written by J. Limkemann. ©1981 S.S.M., Inc. Bug + is a powerful machine language monitor. The one point most improved over other monitors, is the tape write. Bug + has the ability to write a "clean" tape (at 500 baud) this tape will read into the TRS-80 under the system command, without the problems previously associated with the volume setting. Regardless what version basic you have or whether or not you have a Radio Shack cassette fix, this monitor will improve the reliability of your cassette by 100%. There is also a verify command that works the same as also a verify command.

Finally a break point that works! When a break point is reached, there is a blinking astrick in the bottom right hand corner, you are able to see what is on the screen before the monitor takes control. Press the enter key the screen clears and the monitor comes to life. When you continue from a break point, the monitor will restore the screen first then load the CPU registers and return to your program. You do not lose your program or display, and it does work!

Bug + also has all the commands of T-Bug, they just work better. Bug + loads into low memory, then relocates itself.

Model I version plus it gives you the ability of reading or writing 1500 baud or 500 baud or 500 baud tapes. you can read at on rate and write at another. MOD I or III. 4K, both on same tape **$14.95**

See last page of ad for ordering information.

SSM SOFT SECTOR MARKETING, INCORPORATED ✓494

& Victor Andrews

present

Quality Products That Will Make A Believer Out Of You!

POSTMAN DATA HANDLER

By Alger Software. ©1980 S.S.M., Inc. A machine language mailing list program that will do the following:

- 650 labels on a 35 track disk drive
- 750 labels on a 40 track disk drive
- 1534 labels on an 80 track disk drive
- 10 fields (2 user defined)
- Fast sorts (500 records in 30 seconds)
- Written for (1) drive system (capacities shown are for a single drive system)
- Most any label stock that is one up can be used (you save no money buying labels that are more than one up anyway)
- Print one label at a time or a sequence of labels
- Purge duplicates with or without user assistance
- 9 digit zip code
- Super fast search on any field - 3 second average
- Easy screen editing

Now Postman Data Handler has been upgraded with many new features. Now this very popular mailing package is not just the best way for most people and small businesses to do their mailing lists, but now we give you a way to uncramp, convert and formletter your mailing list. You need this package if one of the following is true: If your mailing package is memory dependent. This means that you must have more memory to handle more names in your machine; If you need a way to get rid of duplicate names in your mailing list; If you want to sort on more than just name or zip. (our package can sort on any or all 10 fields at once.); If you are waiting more than one minute for your sort to finish. (our package is in machine language so it runs very fast); If your present program will not handle the 9 digit zip code; If your program doesn't have full screen editing. This package is a machine language program, this is the reason for the super fast speed of all functions!

This is a random access disk based program and any name can be called to read, write, print or update in 3 seconds or less. Now along with it you get utilities that permit you to do the following: CONVERT 1; takes all the files from your old mailing list and converts them to our system. (Why should you change to our system if we made the change hard?) CONVERT 2; convert from our package back to ASCII files if you want to do something with them (like send them to another computer over the phone). MOD I (coming soon for the MOD III). This program runs on all quality operating systems. Requires 1 disk drive ad 32K memory.

..... only **$125.00**

Coming soon – MOD III version

MAILING LABLES 5000 ..... **$14.95**
Plus $2.00 shipping

POSTWRITER

©1981 S.S.M., Inc. Now there is, at extra cost, a formletter package that permits inserting any of the 10 fields of imformation from "Postman Data Handler" into any part of a letter, (yes even in the body of the letter), and right and left justify the letter. This program is made to be used only with the Postman program and one of the following word processing packages: Lazy Writer or Electric Pencil.

..... **$49.95**

MINI POSTMAN

Sample Package. For you people who have a small mailing list (max. 26 names) and/or you can't believe that Postman is the best package and we must be overstating how well this program runs; try our sample package called Mini Postman. It comes as an up and running program and shows you how good our package really is. This package can be upgraded to the full package within 30 days of purchase by calling and saying "I want the full package", and paying the difference between the mini and the full package. Note: Mini Postman does not include the convert utilities. If not everything you expect, return sample disk for full refund (less shipping). You can't lose.

..... **$25.00**

Special

If you purchase both Postman and Lazy Writer at the same time, at list price, (or if you already own one of the packages above and now want to purchase the other), we will at no extra cost include the Postwriter package FREE. There are 2 ways to purchase this package. The first way is to say "I want the best package on the market so send me the full system at one time". This includes the Postman Data Handler, Convert 1 and Convert 2. The package works on all quality operating systems based on the Tandy disk format (TRSDOS, VTOS, NEWDOS, NEWDOS-80, etc.)

$250.00

This price is only good till June 1, 1981.
Save **$49.95**

If purchased separately **$299.95**

GRAPHX

By Steve Skindell. ©1981. This is a program that is for the person who does reports or requires some sort of plotted output to show gains or losses, or any type of output that needs graphs. This program puts to the screen or to a printer the plotted points in bar graph format and plots the mean, and averages of input. This is a very important program for accountants, CPA's and the average businessman to evaluate, at a moments glance where he is, was, or where he is going. Files saved to disk can be recalled at any time to be reexamined, modified, or just reprinted. An extra feature: if you have the Microline 80 printer, by Okidata or Epson MX-80, your output is in true graphics. Information is supplied for the user so he can modify this program for other printers. Comes complete and ready to run. Requires MOD I or MOD III, 48K disk. Printer optional (132 col.) ....
only **$49.95**

SPECIAL – Receive this program for only **$25.00** if you purchase an Okidata Microline 80 or 82 this month from us. Call for our low, low price.

HARDWARE

MOD III Disk Drive Installation Kit

This is the complete kit to install your OWN Disk Drive into your own MOD III, with household tools. Complete installation manual.

$442.00

The only thing you provide is your MOD III, your disk drives, and any MOD III operating system. About one hour installation time. **Shipping included.**

AMI
A.M. ELECTRONICS, INC.

See last page of ad for ordering information.

An innovative word processing system for TRS-80* MOD I & MOD III

Lazy Writer®*

Now accepting orders for MOD III version

©1980 by David Welsh

MOD I – $125
MOD III – $175
*Requires 2 drives for conversion only.

It is time to put your word processing program away and use a Word Processing System

*Lazy Writer is the product of ABC Sales

LAZY WRITER Takes on Scripsit© by Radio Shack® and Electric Pencil©®

Has all the things that other word processing programs should have. Easy to use, written all in machine code. / It permits the inserting and deleting by characters, words, sentences, and paragraphs / Page scrolling up and down / Search ahead of the cursor or behind the cursor for any character / The cursor can be moved up, down, left and right / You can seek top of file and bottom of file / Block move of text, block delete of text/ Search and replace or search delete / Unlimited insert (to the limit of your machines memory) / Permits use with lower case /

Has things that other programs should have, but don't. Upper and lower case output to your printer (if your printer accepts lower case) without having your computer modified. ON UPPER CASE ONLY MACHINES: This program marks the capital letters so you can see which letters are CAPITALS and which are not. / Will change all upper characters text to lower case or all lower case to upper, A SINGLE COMMAND / Will capitalize the first letter of all sentences and all proper noun I's, WITH A SNGLE COMMAND / LOADS ANY ELECTRIC PENCIL / FILE, ASCII SAVED FILES, EDTASM FILES or BASIC PROGRAMS SAVED ASCII / Permits installing special control characters in your text for your printers special features, like double wide or condensed print / Definable screen length and definable print length to 255 characters wide / Screen editing that is not final till your command. This means that you can edit your file on the screen and if you don't like how it reads you can cancel and leave it the way it was / You can append files (which means that you can put one file to the end of another file) / No lost characters at the end of the line, even for the fastest typist / A directory of all your files is available to the user without leaving the program / Saving programs to disk easy enough for the non-computer user / To save memory, not all the program modules are in memory at one time but are called from the disk as needed / You can set tab positions like on a typewriter / 10 CUSTOM COMMAND KEYS for the experienced user there is a command file that permits many special functions that are all user defined (not enough space for better explanation in ad, send for complete overview) / Program has HELP file that is a short review of the commands that are available /

Standard Printer Module. This printer module is provided for the user as a standard feature. Optional special printer routines for custom printer will be available in the near future. In this original release, it has the following printer drivers and will support the following printing devices: RS232, TRS232 and PARALLEL printer ports. You have the following format commands: Justifies Text, Centers Text, Centers Title, Line Spacing, Line Length from 3-255 characters and Set Margins / Also send any ASCII code to any printer from the text / Save formatted text to the disk for spooling later / Information for customer to load his own special printer driver / Printing can be stopped and started by the user at any time and then restarted where you left off / You can print entire file or just print to bottom of the page /

Communication Package. RS232 COMMUNICATION TERMINAL PROGRAM permits you to communicate with other computers. Transfer files from one machine to another. Permits dumping memory across the phone lines. Receive files from other TRS-80's and "Shake Hands" with larger computers. This is the complete system called LAZY WRITER. There is no package written for the TRS-80* that is as comprehensive. This package is available for the TRS-80* MOD I, 32K or larger with at least a single disk drive. List price is from

$125.00

Dealer Inquiries Invited

VISA · master charge

SSM SOFT SECTOR MARKETING, INCORPORATED ✓434
6250 Middlebelt • Garden City, MI 48135
(313) 425-4020

C.O.D - Certified Check, M.O. or Cash only. Sorry, no C.O.D. over $150.00! Most orders shipped next day. All orders must have shipping included. Please add 2% or $2.50, which ever is higher for shipping. Michigan residents, please add 4% tax. Add extra $1.50 for C.O.D. Personal checks take 3 weeks to clear. Send $1.00 for catalog - get $2.00 credit on next order.

NEW FEATURES in Lazy Writer
"The People Request, and David Welsh Delivers"

The system permits embedding ASCII commands into the text of the program. NOW you can do SUPERSCRIPT and SUBSCRIPT (if your printer can handle it). Underlining and boldface, printing of a single word in a paragraph, is now possible, at no extra cost.

A key that remembers the cursor position.

User definable special character. For use with printers that have printable characters that the TRS-80 keyboard does not normally support.

Margin control from within text. This means that you can change the margins of your printed text without stopping the printer routine and changing it.

Page offset with odd/even headers & footers. This means that you can print one page offset to the left of center and the next page offset to the right. This is very nice when you are writing a book.

Printing chaining feature. This permits having more than one file on disk and create one printed letter, contract, or book without having to reset the printer commands.

Mandatory space command. This is necessary when you are writing letters or papers that have certain words that are not to be broken-up. eg.:John P. Andhouser. This name can be made to be unbreakable to justify routines in the program.

Disk catalog. Now you can load your disk directory into memory and create a file of this informqtion.

Now loads Machine Language extention programs that are writen for Lazy Writer.

SSM SOFT SECTOR MARKETING, INCORPORATED ✓496

& Victor Andrews

present

Quality Products That Will Make A Believer Out Of You!

SUPER UTILITY

©1980 by Kim Watt of Breeze Computing, Inc. Sold on protected media only.

Main Program list:

Zap Utility; display sector (disk, file), display memory, compare disk sectors, copy disk sectors, verify disk sectors, zero disk sectors, string search, sector search, single or double density diskettes (if your machine works normally with double density).

Purge Utility; kill selected files, get disk directory, zero unused directory entries, zero unused granules, remove system files, kill by category, change name, date, password, auto command, change file parameters, remove passwords.

Disk Format Utility; standard format, format without erase, special format, read address marks.

Disk Copy Utility; standard copy with format, standard copy without format, special copy (to back up many protected disks) - purchaser use - only for his own personal disks.

Tape Copy Utility; this program is to make backup of many TRS-80 tapes, no matter how it is recorded (note again this program is for the use of the original purchaser for his own programs only).

Disk Repair Utility; repair gat table, repair hit table, repair boot, read protect directory track, recover killed files, check directory.

Memory Utility; move memory, exchange memory, compare memory, zero memory, test memory, input byte from port, output byte to port, memory to disk, disk to memory.

MOD I, protected disk only **$49.95**
Back up copy available!

QUICK FIX

©1981 by Kim Watt of Breeze Computing, Inc. The sister program to Super Utility "the Grand Master" of utility programs, and has the ability to do all the things that have made Super Utility great, except: it does not have the following features; it doesn't have the Special Copy that backs up most TRS-80 readable protected diskettes, it does not have Tape Copy feature that copies many TRS-80 MOD I readable tapes, the Zap program does not go to double density diskettes, it does not have the Special Format feature.

Main Program List:

Quick Zap; display sector (disk, file), display memory, compare disk sectors, copy disk sectors, verify disk sectors, zero disk sectors, string search, sector search, examine address marks.

Quick Purge; kill selected files, get disk director, zero unused directory entries, zero unused granules, remove unused system files, kill by category, change name, date, password, auto command, change file parameters, remove passwords.

Quick Format; standard format, format without erase.

Quick Backup; standard copy with format, standard copy without format.

Quick Repair; repair gat table, repair hit table, repair boot, read protect directory track, recover killed files, check directory.

Quick Memstuff; move memory, exchange memory, compare memory, zero memory, zero memory, test memory, input byte from port, output byte to port, memory to disk, disk to memory.

The one extra feature it has is: you can put Quick Fix on all your diskettes. MOD I. On nonprotected diskete ..... only **$34.95**

OTHER THINGS from Kim Watt of Breeze Computing, Inc.:

MAKE 80

©1980 AM Electronics. Written by Kim Watt. This program is for people who have 80 track disk drives and do not wish to keep that old 40 track drive just to load their 80 track system. Make 80 is loaded into your machine when it is placed in your 0 80 track drive, and the reset button is pressed. It loads automatically and asks for 35 or 40 track diskette. When you insert your diskette in the drive the program reformats the diskette so your 80 track disk system can read all of the information from the diskette without having to have a 40 track drive. This program works on standard NEWDOS, TRSDOS, NEWDOS-80 diskettes. Does not work on any disk that has any funny sectors (VTOS) or with the LOBO interface. 80 track disk only. **$14.95**

SPACE COLONY

by Kim Watt. Space Colony is a space invaders type game for TRS 80 MOD I and with Programma Graphix 80 board. One level of play single player, with sound. MOD I, 16K Cassette **$14.95**

CAPTURE/SYMON

By Breeze Computing, Inc. Capture is a 2 person game of Blockade for the MOD I. With sound this game comes alive with fast action. MOD I, 16K. Cassette **$12.95**
Disk **$17.95**

MX-80 Package Special!

Month of May Only
Hurry – Supply Limited!

SAVE UP TO **$162.95***

YOU PAY ONLY **$599**

MX-80 – New

And At No Extra Cost To You:

1 Box of Paper (2700 sheets.20# white)
2 Extra Ribbons
1 Extra Print Head
and Shipping Included for all UPS in U.S.

***Compared to all items at list price!**

Sorry, No C.O.D. on this special. To receive this discount you must prepay.

If you don't require all these extra items, call for price.

HOW TO ORDER

SSM
SOFT SECTOR MARKETING, INCORPORATED

6250 Middlebelt
Garden City, Mi 48135
1 (313) 425-4020

MasterCard VISA

Dealer inquiries invited.

C.O.D. – certified check, M.O. or cash only. Sorry, no C.O.D. over $150.00! Most orders shipped next day. All orders must have shipping included. Please add 2% or $2.50 whichever is higher for shipping (unless otherwise stated) Michigan residents, please add 4% tax. Add extra $1.50 for C.O.D. Personal checks take 3 weeks to clear. All hardware must be prepaid. No hardware shipped collect.

*TRS-80 is a product of Radio Shack, division of the Tandy Corporation.

NEW PRODUCTS

edited by Bert Latamore

Read the Stars By Computer

Three new programs for TRS-80s will read the future according to astrology.

The Astro-Scope gives individual astrological readings of 1,500 words or more for $30 for the screen version or $200 for a printout version which includes a license to reproduce textual material commercially.

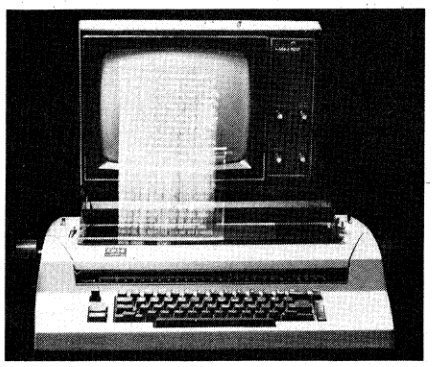
The Sex-O-Scope also does a full astrological readout, but it interprets it from a sexual viewpoint. Cost is $30 for screen or $200 for a printout version with commercial license.

The AGS-1 Natal Horoscope gives a complete calculation of a natal horoscope for use by professional astrologers. Priced at $125, it must be special ordered as the supplier tailors the program to the buyer's system.

Also available is the AGS Machine Language Sort which sorts 1,000 items in about four seconds at a cost of $50 for end users and $300 with commercial license.

All are available from AGS Software, Box 28, Orleans, MA 02653.

Reader Service ✓172



Mediamix Interface

Teach Your Micro to Type

The ETI² is a new, sophisticated interface that will connect any IBM Electronic Typewriter Model 50, 60 or 75 to any computer with a standard parallel printer port.

The Z-80 controlled interface has 2000 bytes of RAM and total access to all the typewriter's automatic functions. It allows you to adapt most word processing programs to the typewriter without modifying the program.

Information and prices are available from Mediamix, PO Box 67B57, Los Angeles, CA 90067.

Reader Service ✓342.

Education Catalog Printed

Queue Catalog IVB lists educational software from 70 publishers for the TRS-80 and Pet organized by computer, subject area and grade level. Catalog IVA will list the same information for Apple, Atari and Compucolor.

The catalogs are $8.95 each from Queue, Inc., 5 Chapel Hill Dr., Fairfield, CT 06432.

Reader Service ✓350

Guide Lists 100 Commands

A 10-page quick reference guide to the Oasis software system lists more than 100 commands derived from the 1000 page user's manual.

The guide lists major commands for single and multi-user systems, EXEC interactive job control language, a general purpose Text Editor and others. It is available for $1 from Phase One Systems, 7700 Edgewater Dr., Suite 830, Oakland, CA 94621.

Reader Service ✓346

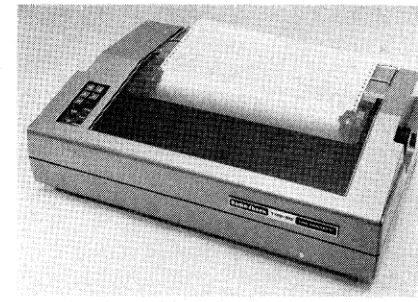
New TRS-80 Line Printer Designed for Business Use

The new high speed TRS-80 Line Printer V from Radio Shack is designed for heavy business use.

It has a bidirectional, logic seeking, dot matrix head that prints 7 × 9 upper and lowercase characters 132 columns wide. It handles 5, 7.5, 10 or 15 characters per inch, 26 European characters and 30 graphics patterns. Print speed is 160 characters per second, 60 lines per minute.

The printer is priced at $1,860 and is available exclusively at Radio Shack stores.

Reader Service ✓174



TRS-80 Line Printer V

Program Teaches Fractions

Fractional Sound is a new program for TRS-80 Models I and III that teaches fractions to students in Grades 4 through 10.

It features seven parameters in either study or test mode, a self-relocating imbedded machine language sound routine, high speed graphics and the character Marley Mole. It requires 15K RAM bytes.

This and two other teaching programs are available on cassette for $14.95 each and on diskette for $18.95 for one, $24.95 for two and $29.95 for all three from Innovative Penquin, 2320 Hampton Dr., Harvey, LA 70058.

Reader Service ✓348

Cables, Programs Offered

E.B.G. & Assoc. have announced two new video connectors for the TRS-80 Model I and two new programs.

The Video Y Connector at $19.95 allows

one computer to run two videos, and the Video Extender Cable at $23.95 allows the TRS-80 video monitor to be moved to a remote position.

The Program of Lists at $19.95 stores up to 20 different lists, and the Pentad Disk Library at $19.95 maintains a library file of up to 100 diskettes.

Information is available from E.B.G. & Assoc., 203 N. Wabash, Suite 1510, Chicago, IL 60601.

Reader Service ✓168

Mod-II Demo Package Offered

The Small Busines Systems Group (SBSG) is offering a demonstration package of TRS-80 Model II software including a catalog, demo diskette and a manual including system reports for dealers and customers.

The demo diskette provides visual examples of various SBSG business programs with a variable speed capability to allow the salesperson time to discuss each example.

The package lists for $50 and the manual is available separately for $25 from Small Business Systems Group, Inc., 6 Carlisle Road, Westford, MA 01886.

Reader Service ✓330

Dirindex Indexes User Files

Programs Unlimited's Dirindex will index your programs, keep track of the size of your file in grans and show the space left on the diskette by side using a Model I disk system.

Dirindex does not rely on any particular DOS system and offers easy deletion of individual files or entire diskettes and full search capability. It will list files to screen or line printer organized in alphabetical or numerical order.

It is available for $19.95 from Programs Unlimited, Inc., 125 South Service Road, Jericho, NY 11753.

Reader Service ✓328

New Disk Drive Announced

A new disk drive for the TRS-80 Model III priced 29 percent below the Tandy-Radio Shack drive is being sold by VR Data.

The new drive plugs in and comes with a 90 day, 100 percent parts and labor guarantee and an extended warranty.

The unit, with one mini-disk drive, power supply, controller and mounting hardware, retails at $599 from VR Data Corp., 777 Henderson Blvd., Folcroft, PA 19032.

Get Data Input At Low Price

A new input interface allows a TRS-80 to read temperature light levels, pressure and voltages and generate a microMAC bus for low cost.

The module allows remote control of lamps, motors, pumps, heaters, appliances, communications devices, etc.

Offered by Connecticut Microcomputer Inc., 34 Del Mar Drive, Brookfield, CT 06804, the TRS-80 mod retails at $59.50 by itself or with a 16 channel AIM16 Analog Input Module, cables and power supply for $295.

Reader Service ✓327

Soundproof Quiets Printer

Dataroyal is offering optional soundproofing for its IPS-5000 intelligent matrix printers that, in an independent test, reduces the noise level of the machines to 63 decibels from the 66 decibels achieved with the standard package.

The option is available at $25 from Dataroyal Inc., 235 Main Dunstable Road, Nashua, NH 03060.

Reader Service ✓161

Medic Package Fills Forms

A new medical office program sorts and keeps patient and master files, maintains billing records, prints reports on Medicare and Blue Shield forms and office invoices, maintains a daily patient list, prints on Medicare and Blue Shield forms, prints a mailing list and even performs word processing.

Compatible with the TRS-80 Model I and II, the system also creates and maintains a literature reference system and keeps track of bank checks.

It is available under an introductory offer at $550 from LaSalle Computing Inc., 1547 DeKalb St., Norristown, PA 19401 until May 15. After that the price will go to $5,500.

Reader Service ✓333

Microconnections

Modems Give Phone Linkup

Microconnection modems will connect TRS-80 Model III and Color Computers with any time sharing system through the public telephone system, according to Microperipheral Corp.

The firm is also offering a new Autodial/Autoanswer Module for the Model III modem to allow unattended data transfer and remote access of the host computer for $79.95.

Both modems can transcribe and play back data communications on a cassette recorder at 300 baud.

The modems cost $199.50 each. Information is available from Microperipheral Corp., 2643 151st Place N.E., Redmond, WA 98052.

Reader Service ✓325

MYCHESS Wins Tourney

Mychess is a new chess program for 32K TRS-80s which has won several computer chess tournaments.

Choose nine different levels with Mychess, and change levels or sides during the game. It will allow time limits for moves and save up to six games for later play or study, will predict the upcoming line of play after any move and take a turn or skip one.

It is available at $34.95 from Programma International Inc., 2908 N. Naomi St., Burbank, CA 91504.

Reader Service ✓160

Buffer Increases Efficiency

The new Microcompatible Print Buffer allows printers, plotters and other slow peripherals to work independently of your TRS-80, increasing efficiency by avoiding tying up the computer.

Poor Man's Floppy

HIGH SPEED CASSETTE SYSTEM

FOR TRS-80*

Now the widely acclaimed JPC Cassette System is available for your TRS-80* computer. The price is only $90.00

TC-8 Cassette System
JPC Products
Albuquerque, NM
Kit: $90
Assembled: $120

by Carl A. Kollar

[Reprint of June 1980 Review, *80 Microcomputing*]

I guess I don't have to tell any TRS-80 owners how frustrating the cassette system that comes with the computer can be. Even with the factory mod that's available, the annoyance of loading and checking programs becomes just barely tolerable.

If you're like me, after you've just plunked down a chunk of money for a Level II 16K machine, "you ain't got nuttin left" for even one disk drive at 500 bucks apiece. So you suffer.

A reasonable alternative is the Exatron Stringy Floppy (ESF). This will cost you about 250 bucks and totally eliminates your loading and saving problems, automatically and fast. I've had one of these for about six months and love it!

But, if the price is still too steep, have I got a device for you!

The Device

The February 1980 issue of *Microcomputing* had an ad that intrigued the hell out of me. It was a high-speed cassette system by JPC Products acclaimed as a "poor man's floppy." It made all sorts of seemingly ridiculous claims such as "loads five times faster," "stores 50,000 bytes on a 10-minute cassette," "less than one bad load in a million bytes with the volume control anywhere between one and eight."

All this for a measly [90] bucks? How could this be? A call to Albuquerque answered a few questions: Yes, it had its own power supply, and, it stored programs five times faster because it utilized higher density data. The computer outputs the information at a higher rate out of the rear keyboard connector.

The ad had even claimed anyone could build it even if you have never soldered before. JPC would make it work, if you couldn't—for free. I was sold. I placed my order, and it arrived about two months later (parts shortage).

I work in electronics, so I found the unit exceptionally easy to build. It took about an hour. The manual is superb. (That's better than great.) It was clear, concise and exact with no ambiguities. Important parts placements are stressed (polarity markings on electrolytics, bands on diodes, etc.).

JPC was right! With these instructions, you couldn't go wrong. The board quality is excellent. It is double-sided and parts locations are clearly marked on the component side of the board. There are no jumper wires to install. JPC utilizes PC traces and plated-through holes for connections to traces on the other side of the board.

Also, there are absolutely no adjustments or settings to bother with.

The documentation is a sheaf of 8½ × 11 papers stapled together. It is written in the nicest format I've seen in a while. Each command and/or subjects is covered on its own sheet in large type. All explanations are in easy to read English—not computerese.

Commands and Features

SAVE"filename": Saves your BASIC program on cassette.
LOAD: Reads the next BASIC program from the cassette.
LOAD"filename": Searches for and loads the specified file from cassette.
LOAD? and LOAD?"filename": Reads file from cassette, and compares contents to memory.
LOADN: Prints a list of all the programs on a cassette, until interrupted by the "break" key.
LOADN"filename": Same as above except the tape will stop at the end of the program named.
KILL: Removes the file manager program from memory so that the extra memory can be used by large programs.
RSET: Allows the operator to rewind and position the tape on tape recorders that have these functions tied to the motor control jack.
RUN"filename": TC-8 searches for a specified program and runs it immediately.
PUT"filename": Same as SAVE "filename", except it is for use with system tapes.
GET: Same as LOAD, except it is for use with system tapes.
GET"filename": Same as LOAD "filename", except it is for use with system tapes.
GET? and GET?"filename": Same as LOAD? and LOAD?"filename", except it is for use with system tapes.
GETN and GETN"filename": Same as LOADN and LOADN"filename", except it is for use with system tapes.
OPEN: Required before cassette input or output of a data file can be attempted.
CLOSE: Required to end a cassette data file.
PRINT#: Allows numerical or string data to be output to a cassette file.
INPUT#: Allows numerical or string data to be input from a cassette file.

I haven't counted them, so I don't know about the "one load in a million bytes" claim, but my son, Anthony (age 11), loaded about 30 of his programs from his Radio Shack format tape to a new TC-8 format tape. He's run them all and found no bad loads.

Unlike the standard tape system, you can position your tape anywhere before the program you want and not have to look for a blank spot between programs. The TC-8 patiently waits for the program you want and then starts loading without getting confused by the portion of the previous program you just fed it.

Try that on your regular cassette system; you'll wear out the reset button. ■

ORDER NOW

To order your TC-8 kit, send your check or money order for $90.00 plus $3.50 postage and handling to JPC PRODUCTS CO., 12021 Paisano Ct., Albuquerque, NM 87112 (New Mexico residents add 4% sales tax). Credit card orders accepted by phone or mail. Personal checks will delay shipment. We will otherwise immediately ship you the TC-8 kit, the cabinet, the ribbon cable, the power adapter, an instruction manual, and a cassette containing the software.

✓190
JPC PRODUCTS CO.
Phone (505) 294-4623
12021 Paisano Ct.
Albuquerque, N.M. 87112

✓See List of Advertisers on page 306

The buffer comes in 16K and 32K sizes with a variety of I/O ports and a printer AC power control option. It can handle up to two input and two output ports with baud rates set separately from 110 to 9600 baud.

The buffers start at $299 from Microcompatible Inc., PO Box 106, Scaly Mountain, NC 28775.

Reader Service ✓341.

Wye Connects Multi-Units

Lords Small Systems Design has produced a wye connector to allow two printers to access the same computer or two computers to share one printer.

Designed originally to allow connection of both a word processing and data printer to the same computer, the wye is U.L. approved and has a bat toggle switch to determine which printer is in use.

The connector is available at $99.95 for the TRS-80 Model I, $129.95 for Model II and $109.95 for the Model III from Lords Small Systems Design, PO Box 99, Port Angeles, WA 98362.

Reader Service ✓334

Color Computer Speaks

"The Speaker" is a totally programmable phonetic voice synthesizer for the TRS-80 Color Computer which plugs into the ROM Pack slot and talks through the monitor television.

The Speaker with demonstration and utility programs in both machine language and Color BASIC is $179.95 from Alford & Assoc., PO Box 6745, Richmond, VA 23230.

Reader Service ✓169

New Program Analyzes Complex Structural Models

The ST10M Finite Element (Space Frame) MC12, allows engineers and architects to analyze almost any structure from airplanes to bridges on any model of the TRS-80.

The program models beam, truss, membrane and plate elements and three-dimensional volumes and generates stresses on individual structural members and deflections of points throughout the structure.

Information on the new program, which fits into only 32K of RAM capacity, is available from McClintock Corp., 7000 SW 62nd Ave., Box 430980, Miami, FL 33143.

Reader Service ✓338

Software Security Enhanced

A new, reversible software enhancement package gives security against unauthorized program modification and plagiarism without changing the program in any way.

The Locker by The Management requires no additional RAM, disk space, assembly language coding or user calls, is permanent and installs easily. The only visible change is that LIST and LLIST will not work.

The Locker is available for $24.95 from The Management, PO Box T, Aledo, TX 76008.

Reader Service ✓331

Fortran Converter Available

The Management's Fortranslator, designed to help translate BASIC programs into FORTRAN, is now available for Model II and III TRS-80s. An enhanced version of their original Model I program is also available.

The program translates BASIC programs into FORTRAN template including subroutine calls and "goto" forms. It is designed to do 60 to 85 percent of the conversion work.

The Model I and III versions are priced at $29.95 and the Model II at $34.95 and are available from The Management, Box T, Aledo, TX 76008.

Reader Service ✓332

Mod III Terminal Gets Smart

A smart terminal program for the TRS-80 Model III is available on 1500 baud cassette and double density disk.

SMARTIII allows transfer of BASIC programs between computer and cassette or disk, off-line text preparation with Electric Pencil or Scripsit for on-line transmission and, with an additional program, file, permits generation and storage of text.

The program, with many other applications, is available for $99.50 from The MicroPeripheral Corp., 2643 151st Place N.E., Redmond, WA 98052.

Reader Service ✓336

RSM Patch Your Model III

A new patch program allows you to use Small Systems Software's RSM with the TRS-80 Model III to provide you a machine code monitor.

The patch operates at both 500 and 1500 baud rates.

The RSM Patch is available from Remarkable Software, PO Box 1192, Muskegon, MI 49443.

Reader Service ✓345

Analyze Investment Property

The Income Propery Analysis System allows analysis of before and after tax cash flows of income properties including rent rates, expenses, and rates of return.

Compatible with the TRS-80 Model I or Model III with at least one disk drive and 32K of memory, it is available from Advanced Business Microsystems, 5801 Marvin D. Love Freeway, Suite 103, Dallas, TX 75237.

Reader Service ✓164

Games Challenge Operator

Challengem is offering five games for the TRS-80 16K Level II or Model III. Subjects are Roman Conquest, Attack of the Yeti, Disaster at Sealab, Time for the Sheriff, and Fighter Run.

They are available for $9.95 each from Anthony Targonski, 106 Fifth St., Cambridge, MA 02141.

Reader Service ✓165

Radio Log, Billing Computed

Radio stations can now keep track of their logs and billing electronically using two new programs for the TRS-80 Model I.

The Electronic Log and The Electronic Bill are available from The Management, Box 111, Aledo, Texas 76008.

Reader Service ✓173

New Printer Costs Less

The Sidewinder is a new low-cost printer for all TRS-80 printer interfaces that prints 12 lines at once on 2-inch wide pap-

er rolls.

Totally LPRINT and LLIST compatible, it prints 30 characters per second with a stationary thermal printing element.

The printer, software driver and a roll of paper sell for $199. An interface cable for the TRS-80 expansion interface is $19 and an interface cable for the TRS-80 keyboard is $49, all from Printel, Inc., Box 21094, Oklahoma City, OK 73156.

Reader Service ✓335

Double Your Memory Easily

Holmes Engineering's Internal Memory is designed to double the memory of the standard TRS-80 Model I to 32K bytes easily and inexpensively.

The device attaches to the RAM sockets inside the keyboard unit without modification or soldering of the unit, and the 10-page instruction booklet makes installation easy for those with little or no technical knowledge.

The unit is available at $47.50 without RAM from Holmes Engineering, 6246W. 3705S. SLC, UT 84120.

Reader Service ✓343

SGL Cuts Electric Pollution

SGL Waber Electric is bringing out a new line of power filters that protect semiconductors from electrical power surges, drops and other forms of damaging "electric pollution."

The new line of Power Master Line Monitor Power Conditioners range from plug-in units to a very sophisticated console or rack-mounted unit. All are designed to smooth out power fluctuations that can damage semiconductors or cause false data input and output.

Information is available from SGL Waber Electric, 300 Harvard Ave., Westville, NJ 08093.

Reader Service ✓337

Model III Gets The Business

The Small Business Systems Group (SBSG) is converting its business software, designed originally for the TRS-80 Model I and II, for use with the Model III.

Out presently are accounts receivable, accounts payable, general ledger and payroll programs and SBSG is working on conversion of their inventory and invoicing systems programs.

The programs are available for $195 each from Small Business Systems Group, 6 Carlisle Road, Westford, MA 01886.

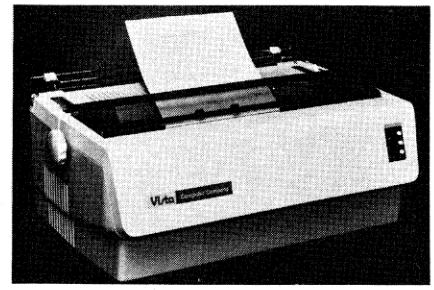
Reader Service ✓329

Printer Driver Is Versatile

The RS-232 is a versatile and flexible new printer driver that offers many parameters and options and works with many printers, using the TRS-80 RS-232-C board.

It is available on cassette at $35 from Micro Systems Software, 3235 Kifer Road, Suite 32, Santa Clara, CA 95051.

Reader Service ✓162



V300-25 Printer

Printer Has Many Features

A new series of daisy wheel printers offers seven- and eight-bit character lengths, single- and double-stop bits, odd and even parity, and 300, 600, 1200 and 2400 baud transmission speeds. A programmable vertical format unit gives you a 66-line maximum form length with top-of-form and VT justification.

The V300-25 printer is priced at $1,895 and the V300-45 and $2,195 from Vista Computer Co., 1317 E. Edinger Ave., Santa Ana, CA 92705.

Reader Service ✓340

Battery Power for TRS-80s

The DC-80 direct connect power converter allows operation for a TRS-80 or expansion interface from a 12 volt battery.

The system gives an uninterruptable power source, 30 percent cooler computer operation and unlimited portability.

It is available for $49 Canadian from Digital Concepts Inc., 116 Moccasin Dr., Waterloo, Ontario, Canada N2L 4C3.

Reader Service ✓167

Computer Plays Blackjack

Casino Blackjack/Counter allows the player to simply play the game, try out playing strategies or learn and practice card counting with between one and four decks. The player has the center hand of five hands and sees all cards as they fall.

Compatible with TRS-80 Models I and III, it comes in cassette for $14.95 or disk for $19.95 from Manhattan Software, PO Box 32, Pacific Palisades, CA 90272.

Reader Service ✓166

EPROM Programs Model I

The EP-2A-79 EPROM Programmer will now interface with the TRS-80 Model I with a TR-24 module. Eleven EPROMs are offered on disk or cassette, all entirely self-prompting. The user can create and edit a program in memory, read an object code from disk or tape, or read and duplicate an existing programmed memory.

The Programmer is available from $169 and the TR-24 interface for $85 from Optimal Technology Inc., Blue Wood 127, Earlysville, VA 22936.

Reader Service ✓347

Reader Interfaces Scanner

Reader interfaces all model TRS-80s with Scan-Tron Model 2012 allowing the computer to read pencil-marked forms for test scoring and analysis, student registration, surveys, inventory and labor accounting and many other applications.

Using less than 1K of RAM, Reader is available on diskette for $175 from Desert Sound, Inc., 16268 Main St., Hesperia, CA 92345.

Reader Service ✓349

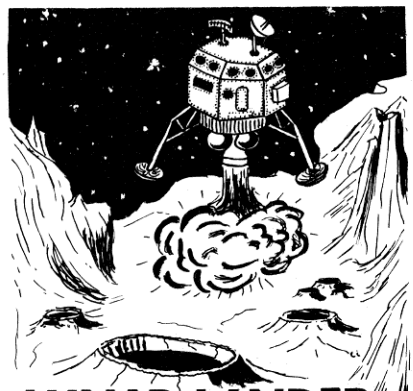
Program Tabulates Polls

A new program for tabulating political, public opinion, sociological or market research polls has grown out of the latest U.S. Senate race.

The new program was originally developed for a successful senate campaign and is extremely flexible, even tabulating open-ended questions. Compatible with any model TRS-80 with 32K and one disk drive, it costs $99.95 from M, M, & S Software, 3 Seabrook Court, Stony Brook, NY 11790.

Reader Service ✓170

THE PROGRAM STORE



LUNAR LANDER

By Wall & Moncrief from Adventure Int.
Calling this program simply "LUNAR LANDER" is like calling the Space Shuttle an "AIRPLANE" -- they are so much more than the names imply! And like the Space Shuttle, this great simulation will get used again, and again, and again...

Moving across your screen is a vast lunar landscape, graphically depicted in both long range and close up, with many choices for landing sites. Choose a more difficult site and get more points -- if you can land successfully. You have complete control of your LEM via main engines and small side thrusters, and a successful landing is heralded with a flag raising ceremony. Great graphics and sound add to the realtime challenge and fun.

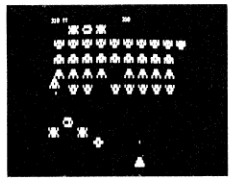
16K tape...$14.95 32K disk...$20.95

STAR CRUISER

From Stratagems
A unique and challenging space game that uses the computer, playing boards, tokens, and two players to manage galactic empires. You must travel through space, seeking alliance with friendly planets, while knowing that your opponent is competing for the same planets and may wage war at any time. Add to this the "normal" pratfalls of interstellar travel and you have a most exciting game, indeed.

16K, includes 2 Starmaps, 308 tokens, rule book, program listing and tape...$14.95

GALAXY INVASION



By Hogue & Konyu from Big-Five
"The rage of the arcades" is now available for TRS-80! Exciting sound effects add to the action as the invaders swoop down to destroy your base. Even while you have your hands full battling the aliens, you have to watch out for the Flagship! Super graphics, super action, super fun!

Level I or II, tape...$14.95

TRS-80 Level II 16K unless otherwise noted

WORD WARS

By Hernhuter & Taylor from Acorn
This two-game package combines sound and graphics to provide hours of fun for all ages. Both games can be played against the computer or as two-person games.

WORD CHALLENGE depicts the length of a phrase. The phrases are either computer generated or typed in by your opponent. The player's challenge is to figure out the phrase, based on the letters guessed.

WORD GAME allows many levels of strategy as you try to guess the letters of a mystery word. The strategy comes in because each letter has points based on its frequency of use in English language, and you are told how many points the mystery word contains.

16K protected tape...$14.95
32K protected disk...$20.95

Unbelievable Realtime 3-D Graphics!

FLIGHT SIMULATION

From Sub-Logic
The wait is over! If 3-D graphics seem impossible on the low resolution TRS-80, you haven't seen this brilliant program. During FLIGHT SIMULATION, you instantly select instrument flight, radar, or a breathtaking pilot's-eye-view. But be sure to strap yourself in -- you're liable to get dizzy!

Once you put in some air time learning to fly your TRS-80, head for enemy territory and try to bomb the fuel depot and airstrip while fighting off five enemy warplanes. Good luck!

Level I or II protected tape...$25.00

LOST SHIP ADVENTURE

From Programmer's Guild
Imagine finding an old sailing vessel -- not on the ocean floor, but floating silently on calm seas. What would you do? The options are all yours in the fascinating new adventure that combines excitement, suspense and terror on the high seas. Does your fortune run to buried treasure -- or a watery death?

16K tape...$14.95

Or try these other P.G. Adventures:
Death Dreadnaught.....$14.95
Thunder Road.....$14.95
Dragonquest.....$15.95

Honestly...

. . . we run into the same problems you do. With so many good programs available, it is hard to choose among them. Our solution is to try to stock them all, but that doesn't solve your dilemma. So, we will regularly offer this column of straightforward comparisons of similar products. Since everyone has different needs, we hope to give enough information to help fill yours. We strive to present factual comparisons of features; the opinions offered are purely subjective, however. If our opinions offend any authors or publishers...

BLACKJACK

AMAZING BLACKJACK MACHINE

By Richard Ramm from Adventure Int.
Not a blackjack playing game, this program uses your playing and betting strategies to play hands automatically -- at up to 2000 hands per hour! It also allows testing yourself on the playing of difficult hands. The betting strategies, both built-in and user defined, are based on point count systems developed by Edward Thorp and refined by Lawrence Revere (the built-in tables seem to be based on Revere's book, "Playing Blackjack as a Business").
The program works well, and while it doesn't allow such subtleties as "insurance" and "surrender," it gives fair leeway in defining various "house rules" and number of decks (up to six). The documentation is scanty -- if you are new to serious blackjack playing and counting, some outside reading is essential to get the most from this program.
16K Tape...$19.95

BLACKJACK MASTER

By Norman Wazaney, Jr. from Hayden
With four operating modes, BLACKJACK MASTER acts as tutor, high speed betting and playing simulators, and computerized dealer. It deals hands from four "decks" using casino rules. While you cannot customize the ground rules to fit a particular casino, this should not be a problem for the average player.
The game portion is one of the best "one-on-one" blackjack dealers we've seen. It allows splitting pairs, doubling, insurance and surrender. The two simulator options let you define betting and playing strategies, but do not allow point-counting. Insurance and surrender are not supported in these high speed modes. The computer plays the chosen number of hands and reports the outcome. The "tutor" drills you playing decisions based on the dealers "up" card.
The program should aid in developing good basic skills for casual blackjack playing. The 60 page manual is useful to novice through expert.
16K Tape...$24.95 32K Disk...$29.95

CASINO BLACKJACK/COUNTER

From Manhattan Software
This program comes closest to being a pure blackjack dealing game, but with useful differences. You choose the number of decks (1,2 or 4) and the dealer's speed (useful in training for quick casino decisions and point-counting). Cards are dealt to five players. The computer plays four hands; you play the hand in the middle. Splitting, doubling, and insurance are supported, but surrender is not.
On your request, the program will tell you the current point count and recommended bet size. Documentation is adequate, but requires outside reading if you wish to learn point-counting.
16K Tape...$14.95 32K Disk...$19.95

WIN21

By Phil Pilgrim from Discovery Bay
While it can be used just for fun, WIN21 is designed as a serious learning tool. It lets you define the number of decks (up to four), how many hands you will play, the number of computer-played hands on either side of you, and the basic "house rules." The strength of the program lies in your ability to exercise various options for betting, counting, and playing: You can let the computer do some of the functions while you work on others; the computer can instruct you in some or all of the functions; it can just point out errors in your play; or it will leave you alone (but will score you based on how you bet and play). The only weaknesses are in not allowing six decks (a common casino practice), and in not supporting "surrender" (an occasionally useful, but sophisticated option).
The package includes Dr. E. Thorp's book, "Beat the Dealer," which is a little dated but still quite valid. If you are willing to practise, the program can teach you to be an excellent player.
16K Tape...$29.95

Visit Our New Store: W. Bell Plaza – 6600 Security Blvd · Baltimore, MD

TO ORDER CALL TOLL FREE 800 424-2738 For information Call (202) 363-9797

THE PROGRAM STORE ✓17
4200 Wisconsin Avenue NW, Dept. K11 Box 9609
Washington, D.C. 20016

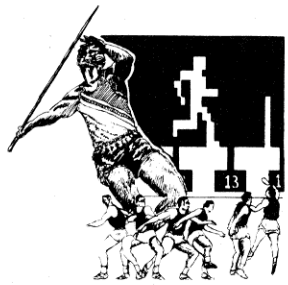
MAIL ORDERS: Send check or M.O. for total purchase price, plus $1.00 postage & handling. D.C. residents, add 6% tax. Charge card customers: include all embossed information on card.

Get the most from your micro with software and accessories from one of the world's largest selections.

The Program Store

CALL TOLL FREE 800 424-2738

OLYMPIC DECATHLON



By Timothy Smith from Microsoft
The graphics capabilities you were promised when you bought your computer are finally utilized in this marvelous series of programs. Just like the real Decathlon, you compete in 10 demanding games that encompass different forms of running, jumping and throwing.

Play alone or with as many as eight competitors, the gold medal will always go to the skillful -- never the luckiest -- because your score depends entirely on skillful manipulation of the keyboard.

One of our more expensive game collections -- and worth every penny! You MUST see this system in action. Otherwise, you simply won't believe the combination of truly outstanding graphics, fast-paced action, nail-biting intensity, and even a touch of comedy you'll experience with Olympic Decathlon!

16K Tape...$24.95 32K Disk...$24.95

COSMIC FIGHTER

By B. Hogue & J. Konyu from Big Five
Terrific sound, graphics and unique challenges mark this new space game a winner! While fighting off the alien convoys, each more skillful than the last, you must keep track of your rocket fuel or risk explosion as you maneuver toward your space station. Can you dock immediately, or is the station overrun by aliens? Find out by ordering Cosmic Fighter today.

16K Tape...$14.95
32K Disk version...$17.95

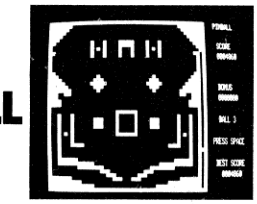
PROJECT OMEGA

By Bob Nicholas -- Adventure International
In probably the most accurate simulation ever produced for a microcomputer, you are responsible for the production, finance, health and well-being of Project Omega, the Earth's first deep space colony.

Painstakingly researched, Project Omega will provide much enjoyment and satisfaction as you overcome the frustrations and obstacles of taming an uncharted environment. The tape version is for one player; the disk version supports one or more, plus a special tournament option.

16K Tape...$14.95 32K Disk...$24.95

PINBALL

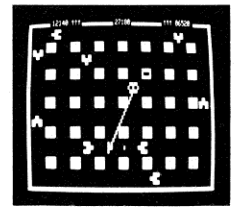


By John Allen from Acorn
Get your flipper fingers ready for action in this real-time, machine language game.

Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scores? Will you avoid the dreaded "Bermuda Square?" Get PINBALL today and find out.

Protected tape...$14.95
Protected disk...$20.95

ATTACK FORCE!



By B. Hogue & J. Konyu from Big Five
Unlike the usual space "shoot-em-ups," your ship is not tied to the bottom of the screen. In Attack Force, you use the arrow keys to control both speed and direction as you maneuver all over the screen in search of the alien Ramships and Flagships. A realtime, machine language game with amazing graphics and sound.

You have to be quick to avoid the enemy ships that warp down on you, and the Flagships' lasers can fire in all directions -- even diagonally! And don't look away for an instant, because one of the alien spacecraft might be transformed into a mirror-image of your own!

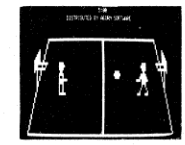
16K Tape...$14.95
32K Disk Version...$17.95

ZORK

By Infocom from Personal Software
In Zork, the Great Underground Empire, unearthly creatures guard 20 treasures. Bring all the treasures back to the trophy case and you can leave alive! You must pick your way through intricate mazes, collecting objects that may help or hinder you in your quest. But keep your wits about you, because in Zork, they take no prisoners!

TRS-80 or Apple II, 32K Disk...$39.95

BASKET BALL



By John Allen from Acorn
You have to be fast to keep up with the action as you try to outscore your opponent in five minutes of one-on-one basketball. Compete against a friend or your computer.

Steal the ball, duck around your opponent and slant toward the basket for a lay up! The graphics are based on a 3-dimensional depiction of a basketball court, and ball dribbling sounds add to the realism.

Protected Tape...$14.95
Protected Disk...$20.95

LDOS

JUST ANOTHER PRETTY DOS?

If new LDOS were just another disk operating system (DOS), we would not recommend it to you. However, two differences make this system unique and important: customer support and user benefits.

When you buy any DOS, you need service for programming assistance, updates and tips on how best to use its features. This is part of what you buy with LDOS. First, you will be supported by a toll-free phone line listed on your registration card. Second, you will be promptly notified of all updates and may send your original diskette to a service center for updating. You pay only the cost of return mail -- you can do it every week if you like. Third, a regular newsletter will inform you of any updates and provide tips on using some of LDOS's many special features.

With LDOS you get a well documented, thoroughly tested, and powerful DOS. The publisher is committed to a professionally written and detailed users' manual. Besides contracting with some of the best microcomputer systems houses for technical and customer support, a highly regarded technical writing firm is doing the manual.

The power of LDOS is its ease of operation, its independence of hardware configuration, and its device independence. You can make selected backups, chain together a series of programs and operations, and operate several different types of drives from the computer. LDOS has all the features of VTOS 4.0, fully implemented and working. There are hundreds of features which we do not have room to mention, but the best features are its ease of use for the new disk owner combined with its sheer power potential for the expert. We will gladly send you more information on LDOS if you just call our toll free number.

LDOS with Manual...$139

THE PROGRAM STORE · Dept K11 Box 9609 · 4200 Wisconsin Ave, NW · Washington, D.C. 20016

Item	Price	Postage $1.00	name
		Total	addr
		☐ CHECK ☐ VISA	city state zip
		☐ MASTERCARD MC Bank #	Card # Exp

See List of Advertisers on page 306

Let's assemble and install that interface.

High Density Graphic Interface—Part Two

Dennis Murray
CompuTech
1005 Chestnut Dr.
Christiansburg, VA 24073

Paul Fowler, Jr.
Enable Electronics
2103 Charlton Lane
Radford, VA 24141

Last month we discussed the theory and operation of the TRS-80 video section and the high-resolution graphics interface. This month we'll explain how to assemble and install the high-resolution interface. The authors felt that the cleanest approach would be a step-by-step procedure with boxes to check off as each step is completed.

Finally there will be a discussion and examples of a software driver for the graphics.

Assembly Procedure

Note: Installing this board or opening your TRS-80 in any way voids the manufacturer's warranty. We suggest that you wait until the warranty period is over before adding this modification.

You will be working with components that are sensitive to static electric discharges. Therefore, standard CMOS handling procedures should be followed.

☐ Check the circuit board (HR1) for solder bridges. Remove any that you find.

☐ Orient HR1 so that the side that says "video out" (on the right hand side of board) faces you. (See Fig. 1.)

☐ In descending order, solder memory chips IC9 thru IC4 in place. Be sure to start with IC9 in the upper right-hand corner. This ensures that all memory chips find their correct mounting holes. Note the location of Pin 1 on each IC, which is designated by a dot or is to the left of the notched edge of the chip as viewed from the top (Fig. 1).

☐ Solder the remaining twelve chips in place.

☐ Double-check orientation of Pin 1 on each IC according to the diagram in Fig. 1.

☐ Solder Dip Switch DP1 in place.

☐ Solder the eleven 10k resistors (R1 thru R11) to the circuit board.

☐ Solder the nineteen .01 uF capacitors as shown.

At this point, construction of the high-density interface board

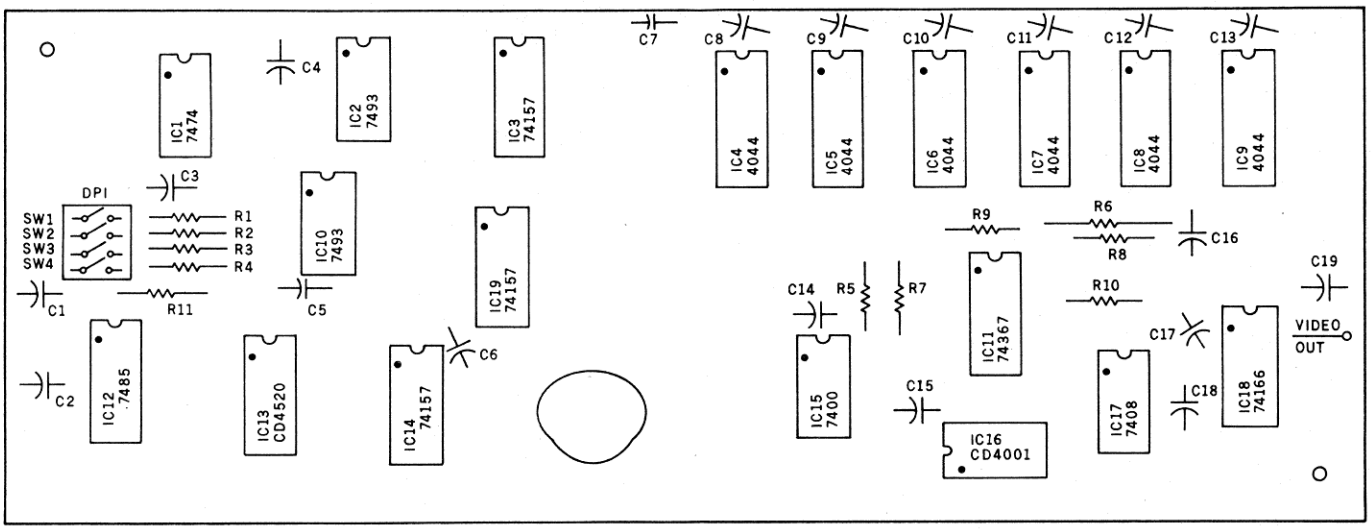


Fig. 1. All Series 74 chips are 74LS (Low Power Schottky).

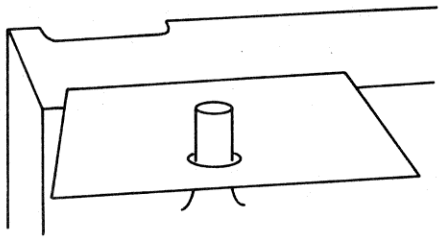


Fig. 2.

is complete. Next we must wire the board in to the TRS-80.

Disassembly Of the TRS-80 Keyboard

☐Remove the power, video, cassette, and any other cables connected to the CPU.

☐Turn the keyboard face down on a soft surface (towel, rug, etc.) to keep from scratching the finish and remove the six screws. Note the position of the different size screws; the longer ones go toward the rear of the unit.

☐Grasp the CPU by both ends, flip it right side up, and lift off the top to expose the keyboard.

☐Lift the keyboard from the back and pull it toward you, taking care not to stress the interconnecting cable going to the CPU board. Remove the five plastic spacers from the keyboard support posts and lay the keyboard back down.

☐Holding the keyboard and CPU board in place, turn the entire unit upside down once more.

☐Lift the bottom off of the case.

☐Set the key/CPU boards aside and lay the case bottom in front of you so that the support posts face you with the longest posts toward the rear.

☐Locate the left rear post. With component side up, place the large 9/16" hole of the hi-res circuit board over the post. (See Fig. 2).

☐Using the 1/8" holes in the upper left and lower right hand corners of the hi-res board as a guide, mark the case bottom for drilling.

☐Drill two 1/8" holes in the case bottom for mounting the hi-res board, but *do not* mount the board at this time.

☐Select a convenient location on the case bottom (or case top) and mount SW5. This switch is for selection of the normal TRS-80 graphics *or* the high-resolution graphics.

☐If you are going to use the memory disable option, locate a convenient location and mount SW6 at this time (see below).

☐Set the case aside.

Getting Wired

Place the hi-res circuit board in front of you and examine the various inputs. Note: SHIFT = SH and SHIFT/LOAD = SH/LD.

☐Referring to Table 1, cut the wires to the length indicated. Trim, tin, and solder them to the hi-res circuit board.

☐On shift and video out use twisted pair with at least three turns per inch. An easy way to make twisted pair is to chuck two lengths of wire in a hand drill, anchor, or have someone hold the other ends of the wires and turn the drill.

Use two different colors of wire to make it easy to determine which wire is grounded and which is signal. Be sure to

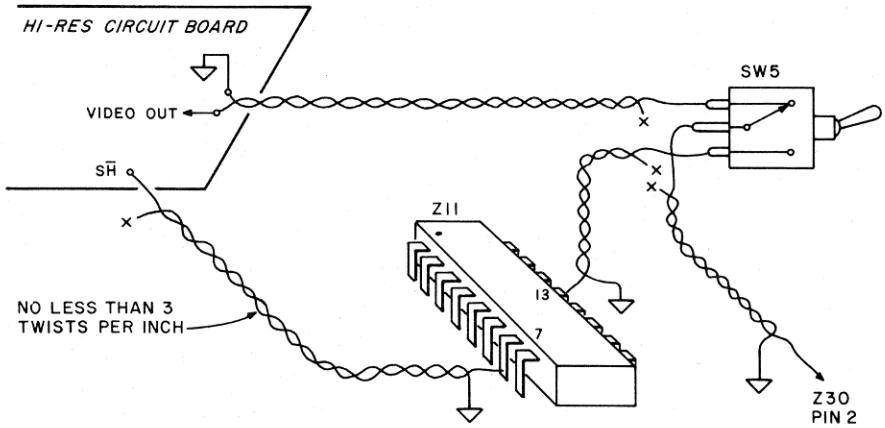


Fig. 3.

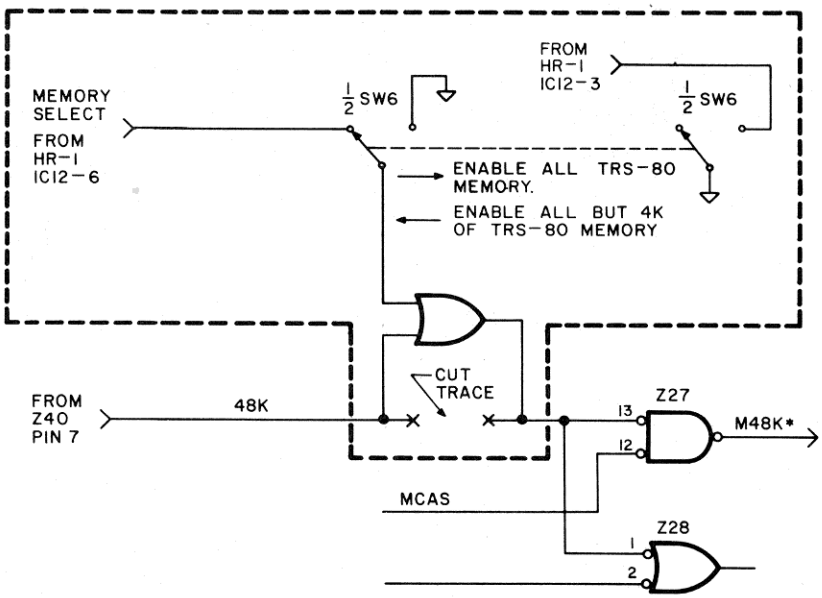


Fig. 5.

HRI MOUNTING PAD I.D.	TRS-80 IC#	TRS-80 IC PIN#	WIRE LENGTH
A3	Z22	13	4½"
A2	Z22	11	4½"
$\overline{WR}$	Z22	5	4½"
A9	Z39	13	4"
A7	Z39	11	4"
A5	Z39	9	4"
A8	Z39	3	4"
A6	Z39	5	4"
A4	Z39	7	4"
A11	Z38	13	4"
A14	Z38	11	5"
A15	Z38	9	5"
A10	Z38	3	4"
A12	Z38	5	5"
A13	Z38	7	5"
A1	Z55	13	4½"
A0	Z55	11	4½"
D1	Z76	13	6"
D0	Z76	11	6"
D2	Z75	13	6"
D5	Z75	3	6"
D3	Z75	5	6"
D4	Z75	7	6"
SHIFT	Z11	7	5"*
SHIFT/LOAD	Z11	15	5"
$\overline{VERT}$	Z32	11	8½"
$\overline{BLANK}$	Z30	10	9½"
HORZ	Z30	8	9½"
+5	Z55	16	5½"
GND	WIDE TRACE	(See Fig. 4)	4"
LATCH	Z9	3	10½"
DOT2	Z24	2	9½"
VIDEO OUT TO	SW5	(See Text)	*

*ASTERISK DENOTES TWISTED PAIR.

Table 1. Connect all wires in the order shown (start at top).

Starting Addr. In Decimal	Hex Value	S4	S3	S2	S1
61440	F000	OFF	OFF	OFF	OFF
57344	E000	OFF	OFF	OFF	ON
53248	D000	OFF	OFF	ON	OFF
49152	C000	OFF	OFF	ON	ON
45056	B000	OFF	ON	OFF	OFF
40960	A000	OFF	ON	OFF	ON
36864	9000	OFF	ON	ON	OFF
32768	8000	OFF	ON	ON	ON
28672	7000	ON	OFF	OFF	OFF
24576	6000	ON	OFF	OFF	ON
20480	5000	ON	OFF	ON	OFF
16384	4000	ON	OFF	ON	ON
12288	3000	ON	ON	OFF	OFF
8192	2000	ON	ON	OFF	ON
4096	1000	ON	ON	ON	OFF
0	0000	ON	ON	ON	ON

Table 2.

ground only one end of the grounded pair. (See Fig. 3.) Make the video out twisted pair long enough to reach one pole of SW5.

☐ Place the key/CPU board in front of you and cut the trace from Z11 Pin 13 to Z30 Pin 2. This trace is easy to get to from the unpopulated side of the board.

☐ Place the keyboard upside down (component side up) in front of you.

☐ Turn HR1 component side down and place it on top of the CPU board, being careful to align the large hole.

☐ Starting at the top of Table 1, solder all wires from the originating HR1 mounting pad to the appropriate TRS-80 IC pin number.

☐ Solder GND to the wide trace next to SW1 on the CPU board. (See Fig. 4.)

☐ Referring to Fig. 3, solder one side of video out to one pole of SW5. Use twisted pair.

☐ Solder the other pole of SW5 to Z11 Pin 13 on the CPU board. Use twisted pair.

☐ Solder the throw (center lug) of SW5 to Z30 Pin 2. Use twisted pair.

Hi-res Memory Disable Option

The hi-res graphics interface is a memory-mapped device. Therefore, it is compatible with only the 4K, 16K, and 32K units. If the hi-res memory is to use the same address locations as an existing block of RAM, the memories will fight each other resulting in erratic performance.

If you have a system with less than 48K, set switches SW1 to SW4 to reference a range of ad-

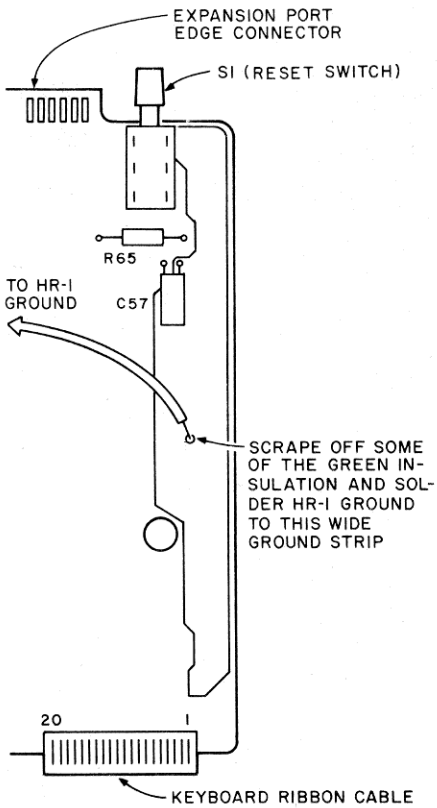


Fig. 4. The Ground Connection

Part	Qty.	Part #	Description
IC4, 5, 6 7, 8, 9	6	2147 or 5257 or 4044	4K × 1 Static Ram
IC18	1	74166	8-Bit Shift Register
IC11	1	74367	Hex Buffer Driver
IC15	1	7400	Quad Dual Input NAND Gate
IC17	1	7408	Quad Dual Input AND Gate
IC16	1	CD4001	Quad Dual Input NOR Gate (CMOS)
IC12	1	7485	4-Bit Magnitude Comparitor
IC1	1	7474	Dual D-Type Flip-Flop
IC13	1	CD4520	Dual 4-Bit Binary Counter
IC2, 10	2	7493	4-Bit Binary Counter
IC3, 14, 19	3	74157	Quad 2-Input Multiplexer
DP-1	1		Quad (SPST) Dip Switch
R1-R11	11		10k Resistor 20% 1/8 or 1/4 Watt
SW5	1		SPDT Miniature Switch
SW6	1		SPST Miniature Switch (optional)
HR1	1		Hi-Resolution Video Circuit Board
			Braided Hook-up Wire
C1-C20	20	.01 uF	Ceramic Capacitors

Note: All TTL Logic Chips May Be of the Low Power (LS) Series.

Table 3. Parts List

Orange Micro

✓296

"THE COMPUTER PRINTER SPECIALISTS"

UP TO 25% DISCOUNTS! — SAME DAY SHIPMENT!

CENTRONICS 737 (RADIO SHACK LINE PRINTER IV)

Word Processing Print Quality

• 18 x 9 dot matrix; suitable for word processing • Underlining • proportional spacing • right margin justification • serif typeface • 50/80 CPS • 9½" Pin Feed/Friction feed • Reverse Platen • 80/132 columns

CENTRONICS 737-1 (Parallel) ..... (List $995) **$765**
CENTRONICS 737-3 (Serial) ..... (List $1045) **$815**

VISTA — C. ITOH

Daisy Wheel Letter Quality

• 25 CPS (Optional 45 CPS) • Typewriter quality • Centronics parallel • RS 232 Serial (Optional) • Proportional spacing • Bidirectional • Programmable VFU • Self test • Diablo compatible • Friction feed (Optional tractors) • 136 printable columns. • Manufactured by C. ITOH.

VISTA V300 (C. ITOH) ..... (List $1895) **$ Call**

EPSON MX80/MX70

OUR BEST BUY!

Low-Priced Professional Print Quality

• 9 x 9 dot matrix • Lower case descenders • 80 CPS • Bidirectional, Logic seeking • 40, 66, 80, 132 columns per line • 64 special graphic characters: TRS-80 Compatible • Forms handling • Multi-pass printing • Adjustable tractors

EPSON MX80 ..... (List $645) **$Call**
EPSON MX 70 Dot graphics, 5 x 7 matrix ..... (List $450) **$Call**

ANACOM

Low Cost, High Speed, Wide Carriage

• 9 x 9 dot matrix • Lower case descenders • Wide carriage • Adjustable tractors to 16" • 150 CPS, Bidirectional, Logic Seeking

ANACOM 150 ..... (List $1350) **$ Call**

ANADEX

Dot Graphics, Wide Carriage

• 11 x 9 dot matrix; lower case descenders • Dot resolution graphics • Bi-directional, logic seeking • Up to 200 CPS • RS 232 Serial & Parallel • Forms control • X-ON/X-OFF • Up to 6 part copy.

ANADEX 9501 ..... (List $1650) **$1350**

OKIDATA MICROLINE SERIES

TRS-80 Graphics Compatibility, Friction Feed

• 9 x 7 dot matrix • 80 CPS • 80, 132 columns — 64 shapes for charts, graphs & diagrams • Double wide characters • 6/8 lines per inch • Up to 3 part copy • Friction & pin feed • 200 M character head warranty

OKIDATA MICROLINE 80 ..... (List $800) **$520**
OKIDATA M82 Bidirectional, Forms handling ..... (List $960) **$750**
OKIDATA M83 Wide carriage, 9 x 9 dot matrix ..... (List $1260) **$1050**

NEC SPINWRITER

High Speed Letter Quality

• 55 CPS • Typewriter quality • Bidirectional • Plotting • proportional spacing.

5510-5 RO, Serial, w/tractors ..... (List $2995) **$2625**
5530-5 RO, Parallel, w/tractors ..... (List $2970) **$2599**

TELEVIDEO CRT'S

AT DISCOUNT PRICES!

TVI 912C
TVI 920C
TVI 950

Please Call Toll Free Prices are too low to advertise

QUANTITY PRICING AVAILABLE

IDS PAPER TIGERS

Dot Resolution Graphics, quality print, speed

• 7 wire printhead (445); 9 wire printhead (460) with lower case descenders • Over 150 CPS • bi-directional, logic seeking (460) • 8 character sizes; 80-132 columns • Adjustable tractors • High-resolution dot graphics • Proportional spacing & text justification (460).

IDS 445G 7 wire printhead, graphics ..... (List $895) **$ 750**
IDS 460G 9 wire printhead, graphics ..... (List $1394) **$1150**
IDS 560G 9 wire, wide carriage, graphics ..... (List $1794) **$1590**

PRINTERS

MALIBU 165 wide carriage, graphics, letter quality .. (List $2495) **$ 1975**
QUME 5/45 typewriter quality ..... (List $2905) **$ 2559**

INTERFACE EQUIPMENT

CCS APPLE PARALLEL Interface & cable ..... **$ 150**
APPLE II - EPSON MX80 parallel interface board & cable ..... **$ 100**
SSM AIO BOARD Apple Serial/parallel interface ..... (List $225) **$ 175**
MICROTRONICS Atari parallel interface ..... **$ 69**
ATARI 850 Interface module, serial/parallel ..... **$ 199**
TRS-80 CABLES to keyboard or Exp. interface ..... **$ Call**
NOVATION D-CAT direct connect modem ..... **$ Call**

CALL FOR FREE CATALOG

(800) 854-8275

CA, AK, HI (714) 630-3322

At Orange Micro, we try to fit the right printer to your application. Call our printer specialists for free consultation.

TELEPHONE ORDERS: Mon.-Fri. 8:30 - 5:00
The Orange Micro Printer Store (Retail):
Mon.-Fri. 10:00 - 6:00, Sat. til 4:00

Phone orders WELCOME; same day shipment. Free use of VISA & MASTERCARD. Personal checks require 2 weeks to clear. Manufacturer's warranty included on all equipment. Prices subject to revision.

Orange Micro, Inc.
3150 E. La Palma, Suite I
Anaheim, CA 92806

```
6000 'THIS SECTION WILL "SET" SCREEN FOR GRAPHICS
6010 FOR W=15360 TO 16383
6020 POKE W,128
6030 NEXT W:RETURN
6040 '
6050 '
6100 ' TO "CLEAR" HI-RES SCREEN
6110 Z=0
6120 FOR W=-32768 TO -29696
6130 POKE W,Z
6140 NEXT W:RETURN
6150 '
6160 '
6200 'TO "SET" HI-RES SCREEN
6220 Z=191:GOSUB 6120
6230 RETURN
6240 '
6250 '
6300 ' THIS SECTION "PUTS" X1,Y1 TO SCREEN
6310 IF X1<0 THEN STOP
6320 IF X1>191 THEN STOP
6330 IF Y1<0 THEN STOP
6340 IF Y1>95 THEN STOP
6350 I1=INT(X1/6) 'I1=HORZ. DISPLACEMENT IN BYTES
6360 I2=Y1*32+I1 ' I2=DISPLACEMENT FROM FIRST LOCATION
6370 I3=2[(5-X1+I1*6)   ' I3 IS THE BIT MASK
6380 I4=I2-1*(65536-32768)  'I4=THE ABSOLUTE MEMORY LOC
     ATION
6390 I5=PEEK(I4) ' I5= PRESENT CONTENTS OF MEMORY
6400 IF X0=0 THEN 6500 'IF X0=0 WE WANT A BLACK DOT; IF

     X=ANYTHING ELSE WE WANT A WHITE DOT
6410 I5=I5 OR I3 'ANY BITS ON LEAVE ON; OTHERWISE, LEAV
     E OFF
6500 POKE I4,I5
6510 RETURN
6600 I3=255-I3
6610 I5=I5 AND I3
6620 GOTO 6500 'GO PUT THIS BYTE TO SCREEN
```

Program Listing 1. High Resolution Drive

dresses not used by your system. (See Table 2.) This range will become the memory addresses used by the high-resolution graphics interface.

If you have a 48K system, then you must disable a portion of computer RAM and enable the hi-res RAM when this mode is desired. This may be accomplished with a DPDT switch as shown in Fig. 5. Note: The authors have not implemented the circuit in Fig. 5. It is presented only as a suggestion.

Learning How to Blink

Now that the serious part is over and we have built this graphics wonder, we need some software to make it work. This is accomplished quite easily with the BASIC subroutines in Program Listing 1. Recalling that the hi-res interface generates 192 dots horizontally and 96 dots vertically, let X1 = the horizontal dots and Y1 = the vertical dots. Therefore, X1, Y1 will define a single point on the monitor screen. Let X0 be a flag that defines the color of the dot: If X0 = 0 the dot will be black; if X0 = 1 the dot will be white. Assume that the screen is ready to accept graphics and that it is totally blank. Also, assume that X1 = 100, Y1 = 50, X0 = 1, and that we have just "GOne SUB" to line 6300. Since line 6300 is a remark we will do nothing.

Lines 6310-6340 check to see that X1 and Y1 fall within the limits of the video graphics. Line 6350 defines the horizontal displacement in six bit bytes (remember, there are only six bits/word in this interface). This value is called I1 and is INT (100/6) = 16 in this case. Therefore, this point 100,50 will be located 16 bytes from the left side of the screen. Line 6360 defines I2 which is the displacement in 6 bit bytes from location 0,0. In this case I2 = 50 lines down × 32 bytes/line + 16 bytes from the first location on the screen (or 1616 bytes from the first location).

The next line (6370) tells us which of the 6 bits in byte #1616 will be on. As you can see $I3 = 2^{(5-100+16\times 6)} = 2^1 = 2$. This means that the second bit from the right in byte #1616 is to be turned on. Why the second bit? Because two decimal equals 000010 binary. If X1 = 99 you would find that I3 would equal 2^2 or 4 and that is the 3rd bit over, or 000100 binary.

The absolute memory location is given in line 6380 by I4. The first screen memory location in this example is at 8000 hex or 32768 decimal. Therefore, the absolute memory location to poke is 32768 plus 1616, right? Wrong! Since the TRS-80 uses ones-complement to PEEK and POKE addresses above 32768 we must obtain the ones-complement of 32768 + 1616. Fortunately, a handy little formula is defined for us in the Level II Manual under the section pertaining to PEEKs and POKEs. Thus, the absolute ones-compliment of the address is—ta-da—1616 − 1 × (65536 − 32768) or −31152 decimal. (32768 is the starting location of the first screen address. If the starting location were C000 hex then this value would be 49152 decimal.) Clear as mud.

Let's review. We know that we want to access the 1616th byte from the starting location of the screen, that the absolute location is −31152 in memory, and that we want to load that location with 000010 binary. So let's go ahead and POKE = −31152 (2), right? *Wrong!*

What about the other five bits in byte −31152? What if they're all on? Then we just POKED a black line into our screen. How to get around this? Simple, PEEK location −31152 and return the value as I5 in line 6390. Look at it and leave ON bits on, and if bit 100,50 is off, turn it on. This is what happens in lines 6410 and 6500.

What? What about line 6400, you say? Boy, some people worry about everything! Remember X0? X0 gives us the option to turn 13 = 000010 off. If X0 = 0 then we would have bypassed 6410 and obtained the compliment of 000010 or 111101 in line 6600. ANDing this with whatever I5 equals would leave location −31152 the same as it was except the 2's bit would be off. Regardless of whether X0 = 0 or 1 we end up POKEing I4, I5 in line 6500 and returning to our main program.

Now, this is all well and good to go POKEing around in the raster, but if you don't heed this one little rule, you won't get what you're after!

The TRS-80 must have its screen set for graphics. This is accomplished by setting the most significant bit of memory locations 3C00H to 3FFFH to a true condition (1). Use the little subroutine from lines 6000 to 6030 for this. It simply POKEs the 1024 memory locations allocated to the TRS-80 normal graphics with 10000000 binary (128 decimal). Remember in last month's discussion that these bits had to be 1s in order for the TRS-80 graphics to be accessed. And so it must be for the hi-resolution graphics. This method allows the normal alphanumerics to be used with the hi-res graphics.

```
10 GOSUB 6000: GOSUB 6100
20 Z=45: X0=1
30 D=1
40 V=-1
50 FOR I=1 TO 2
60 FOR D=D TO D+179
70 A=D*.0174
80 X1=INT(V*COS(A)*45)+Z
90 Y1=INT(-SIN(A)*45)+45
100 GOSUB 6300
110 NEXT D
120 Z=Z+90
130 V=-V
140 NEXT I
150 FOR X1=0 TO 191: Y1=45: GOSUB 6300: NEXT X1
160 FOR Y1=0 TO 95: X1=96: GOSUB 6300: NEXT Y1
170 INPUT Q
```

Program Listing 2. Sine Wave Plot in BASIC

Two more little subroutines have been added for convenience. The Clear subroutine from lines 6100 to 6140 will set all values in the hi-res memory to zero giving a black screen. The Set routine (6200-6730) will set all hi-res values to one, giv-

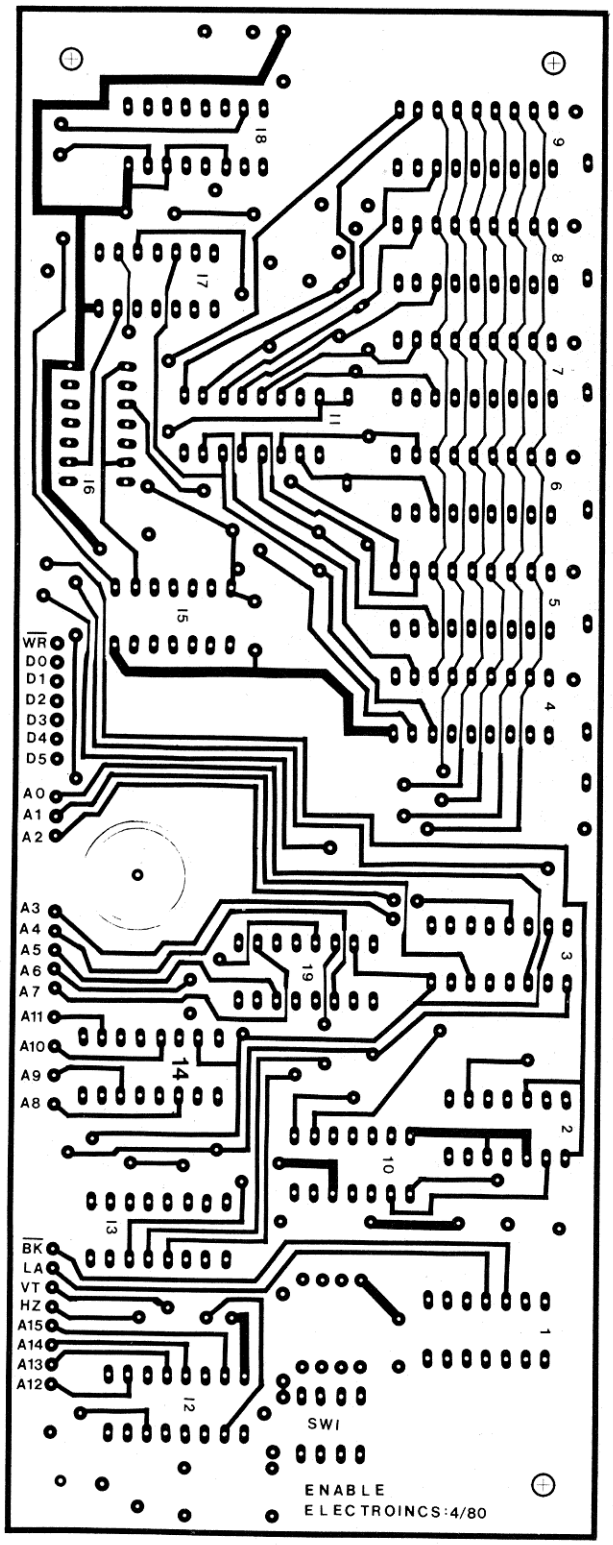
ing a white screen.

Now that Program Listing 1 has been explained, let's say a few words about Program Listing 2. It's a sine wave. Run it.

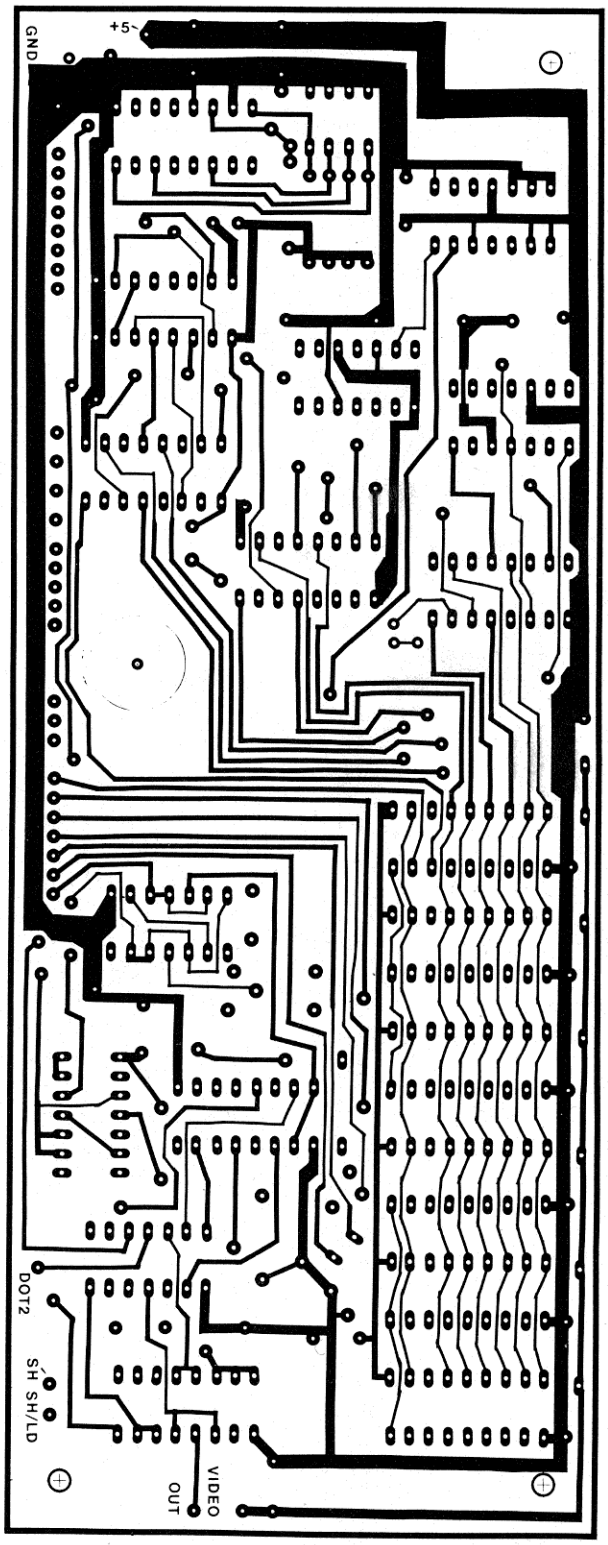
Now that you have High-resolution capability, new horizons will open to you; great challenges, empires will rise and fall! . . . .

Maybe you'll even draw a few graphs. ■

A set of high-speed plotting subroutines written in assembly language will be available in June. These routines are easily accessible from BASIC and will draw a straight line between any two points or plot individual dots. Anyone interested in this package should contact the authors for pricing and recording media available.

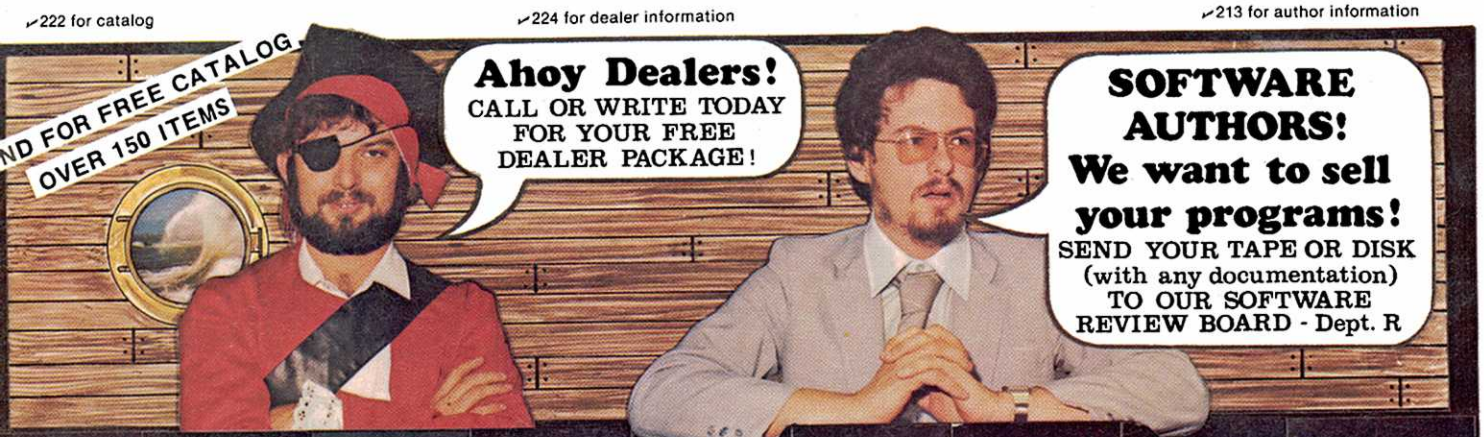


Bottom view



Top View

✓222 for catalog ✓224 for dealer information ✓213 for author information



Adventure INTERNATIONAL

SOFTWARE PUBLISHING DIVISION OF Scott Adams INC.

ADVENTURE INTERNATIONAL BOX 3435 LONGWOOD, FL 32750 (305) 862-6917

This car buying advisor for confused consumers is a lesson in modular programming.

The Auto Mentor

Leslie E. Sparks
1014 Evergreen Drive
Durham, NC 27712

Should I replace my old car? Should I fix my old car that burns leaded gas or get a new one that burns unleaded? Is it worth $1000 to get an extra five miles per gallon?

Interesting questions, aren't they? Especially when you consider that the difference between a right and a wrong answer can be several hundreds of dollars. A properly programmed computer can help you find the right answer. That's right, your computer can start earning its keep.

The hitch, of course, is in finding a properly programmed computer. Mine didn't come out of the box programmed to do anything except ask MEMORY SIZE? But, for me, that's the fun of owning a computer.

All the programs I've developed follow the same general steps.

1) Defining the problem.
2) Developing the necessary relationships—generally mathematical equations.
3) Developing the basic structure for program.
4) Coding the problem in computer language.
5) Typing the program.
6) Debugging.
7) Writing documentation.

Problem Definition

Your problem must be defined in a way that the computer can be programmed to answer the question. At the same time, you must develop the criteria for making a decision.

The question, "Should I get a new car?" is not specific enough for the computer.

What is it that we really want to know?

The question really is: What is the optimum way to spend my car money? The criteria are economic and this optimum is defined in economic terms.

The problem is still a long way from well specified. What is this economic optimum? How is it calculated?

"The concept of present value is used in most investment analyses and is a way of comparing cash flows with different timing on a common basis."

Our original question is actually an investment problem. According to one theory of investment analysis, the optimum is that month which maximizes the net present value of keeping the old car and replacing it at the end of the month, compared with the costs of replacing the old car now. Two more questions: What is the value of keeping the old car? What is it's present value?

Take the easy one first. The value of keeping the old car, V, is the total cost of owning and operating the new car, TC(New), minus the total cost of owning and operating the old car, TC(Old). Or mathematically:

$$V = TC(New) - TC(Old)$$

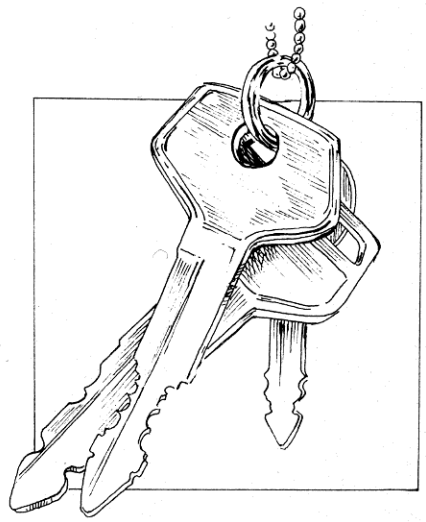
If the value of keeping the old car is negative, it's obviously time to replace it. But the optimum time may occur while the value of keeping the old car is still positive.

The total cost of owning and operating a car, old or new, can be broken into separate items.

- The cost of fuel, F.
- The cost of normal maintenance, M.
- The cost of insurance, IN.
- The cost of special repairs, S.
- The cost of monthly car payment, IP.
- The cost of the down payment, Down.

The benefit of getting a new fuel efficient car is that fuel costs will be less for the new car; maintenance costs may also be lower. Balanced against the fuel cost savings are the down payment, the monthly car payment and, probably, the cost of insurance.

How are the future benefits and costs compared so that a decision can be made?



REMSOFT, Inc.

Let Your TRS-80® Teach You

ASSEMBLY LANGUAGE

Tired of buying book after book on assembly language programming and still not knowing your **POP** from your **PUSH**?

REMSOFT proudly announces a more efficient way, using your own TRS-80®, to learn the fundamentals of assembly language programming --at YOUR pace and at YOUR convenience.

Our unique package, "**INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING**", will provide you with the following:

- Ten 45-minute lessons on audio cassettes.
- A driver program to make your TRS-80® video monitor serve as a blackboard for the instructor.
- A display program for each lesson to provide illustration and reinforcement for what you are hearing.
- A textbook on TRS-80® Assembly Language Programming.
- Step-by-step dissection of complete and useful routines to test memory and to gain direct control over the keyboard, video monitor, and printer.
- How to access and use powerful routines in your Level II ROM.

This course was developed and recorded by Joseph E. Willis and is based on the successful series of courses he has taught at Meta Technologies Corporation, the Radio Shack Computer Center, and other locations in Northern Ohio. The minimum system required is a Level II, 16K RAM.

REMASSEM-1 only $69.95

LEARN TRS-80® ASSEMBLY LANGUAGE DISK I/O

Your disk system and you can really step out with **REMSOFT's** Educational Module, **REMDISK-1**, a "short course" revealing the details of DISK I/O PROGRAMMING using assembly language.

Using the same format as our extremely popular introduction to assembly language programming, this "**ASSEMBLY LANGUAGE DISK I/O PROGRAMMING**" course includes:

- Two 45-minute lessons on audio cassette.
- A driver program to make your TRS-80® video monitor serve as a blackboard for the instructor.
- A display program for each lesson to provide illustration and reinforcement for what you are hearing.
- A booklet of comprehensive, fully-commented program listings illustrating sequential file I/O, random-access file I/O, and track and sector I/O.
- A diskette with machine-readable source codes for all programs discussed, in both Radio Shack EDTASM and Macro formats.
- Routines to convert from one assembler format to the other.

This course was developed and recorded by Joseph E. Willis, for the student with experience in assembly language programming; it is an intermediate-to advanced-level course. Minimum hardware required is a Model I Level II, 16 K RAM one disk drive system.

REMDISK-1 only $29.95

Dealer inquiries invited

REMSOFT, INC.

571 E. 185 st.
Euclid, Ohio 44119
(216)531-1338

✓70

Include $1.50 for shipping and handling.
Ohio residents add 5½% sales tax.
TRS-80® is a trademark of the Tandy Corp.

Timing Important

It is incorrect to compare all these costs, or cash flows, unless their timing is also considered. The comparison is made by adjusting all the individual costs to a common time—the present. The present value of keeping the old car is found by taking all the current and future cash flows for both the old and new car and adjusting them to the present.

Future cash flows have to be adjusted because a dollar is worth more now than a dollar received next year. The current dollar can earn interest, for example, and will be worth a dollar plus the interest in the future. This adjustment is called discounting, and may be looked at as the opposite of compounding interest. All these discounted cash flows are then totaled to give the present value of keeping the old car.

The discount factors are:

- $df = 1/(1 + r)\uparrow N$ for a one-time cash flow at period N.
- $df = (1 - (1/(1 + r)\uparrow N))/r$ for a series of equal cash flows with $r <> 0$.
- $df = N$ for a series of equal cash flows with $r = 0$.

N is the number of periods and r is the discount rate.

One additional complication is that costs escalate with time. This escalation of costs can be balanced by replacing the discount rate with an effective discount rate (the discount rate minus the escalation rate).

What is the discount rate? A good value for the discount rate is the risk-free interest that you can earn on your money.

It is now possible to write a complete set of equations for keeping the old car N more months and then replacing it. Or purchasing a new fuel efficient car immediately. These equations are given in Table 1. These equations include the effects of taxes, the trade-in value of the old car and the salvage value of the new car. We are interested in the incremental costs. If, for example, the escalation rate of new car prices is the same as the discount rate, then no costs are incurred as a result of lost interest by purchasing the new car now.

Running the Program

Let's begin translating the equations in Table 1 into a computer program.

The program must do the following tasks:

- Get data from the user.
- Calculate the present value of keeping the old car.
- Display the results on the CRT.
- Print the results on a line printer, if the user wants.

Each of these tasks should be handled in a subroutine or program module. This means, for example, that data input doesn't

Fig. 1. Sample Problem Results

$$$

"The main program module is a series of GOSUB statements that transfer control to the other modules as needed."

```
$$$
```

At 5½, she's reading and thinking at a 4th grade level.

Is she a prodigy? Not at all! When learning is fun, your child can rapidly increase reading comprehension and reasoning power beyond current age level.

Now you can advance your child's educational level—without coaxing or hiring an expensive tutor. Everyone knows the best student-teacher ratio is 1:1. In modern classrooms, this is impossible. But in your own home, it's as easy as C.A.I. (Computer-Aided Instruction). Without the distractions of a crowded classroom, students can progress, without pressure, at their own pace.

Computers are fun, and once the fun is introduced, studying becomes a pleasure—instead of a chore. The ability to interact with the computer will motivate your child to learn much more than from a book that cannot respond—a book that is too easily closed. These Instant Software programs will guide and teach each lesson with the infinite patience only a computer can provide. Each of the twelve packages have been written and edited by professional educators who know what it takes to make a child want to learn. You can introduce your child to the world of learning by computer with Instant Software's Educational Software Series. All 12 packages are available now.

ARCHIMEDES' APPRENTICE

Archimedes Apprentice is a geometry package that will teach your child the formulas used to find the volume of any solid object, including parallelopipeds (cubes and rectangular solids), prisms, pyramids, cylinders, cones and spheres. It will even quiz the student on how well the lesson was learned. Give your child the advantage of learning these concepts at home, before being faced with them in a classroom. **Order No. 0092R $9.95**

TYPING TEACHER

A complete seven-part package that guides you from familiarization of the keyboard through typing words and phrases to mastery of touch-typing. Your video monitor becomes a bottomless page for typing practice, and your own private TYPING TEACHER, ready to teach when you're ready to learn. **Order No. 0099R $9.95**

TEACHER'S AIDE

Now you can have the benefit of Computer Assisted Instruction (CAI) in your own home. The Teacher's Aide program allows you to create tailor-made lessons for your child. The features of this program include the ability to review material before taking the lesson, a provision for hints to help answer questions and graphic displays as a reward for answering all questions correctly. Once you've created a lesson, you can save it and create an entire sequence of lessons.

The Teacher's Aide package is perfect for parents, teachers, and students who need the unlimited patience only a computer can provide. **Order No. 0214RD (disk-based) $39.95**

VIDEO SPEED READING TRAINER

With this package, students can increase their reading speed and comprehension. How? With practice! This three part program will flash characters, words and phrases onto the monitor screen. You must then type what you saw on the keyboard and enter it. You can begin at a relatively slow speed. As your speed and comprehension increase, the computer will automatically advance your speed. **Order No. 0100R $9.95**

IQ TEST

Are you smart enough to buy this package? IQ TEST will administer and score an intelligence test in 30 minutes. There are three equivalent tests, each consisting of 35 questions, designed to test your general knowledge and problem-solving abilities. Most of us claim a "touch of genius"—here's your chance to prove it! **Order No. 0157R $9.95**

VOCABULARY BUILDER

One of the most valuable tools your child can possess is a comprehensive vocabulary. With Instant Software's VOCABULARY BUILDER package, you can help your child develop a better understanding of the English language—and the fun is in the learning! The crossword puzzle format of these programs will hold the attention of the most reluctant student. The first program in this package is "Polonius," offering 140 crossword puzzles. The second is "VeeBeeGee," a program that provides the letters and allows the student to construct a puzzle on the game board. The VOCABULARY BUILDER package is educational entertainment for all ages—and it's never at a loss for words. **Order No. 0198R $9.95**

Instant Software™ ✓2

Prices subject to change without notice.

PETERBOROUGH, N.H. 03458
603-924-7296

Now Your Child Can Learn More . . . At a Faster Pace

NEW!

GEOGRAPHY EXPLORER: U.S.A.

This program allows your child to travel the country and learn vital facts about each of our 50 states. Geography Explorer offers the most fascinating way of learning yet. Learn each state's name, capitol, largest city, nickname, etc. As a bonus, this package offers the capability of light pen use. **Order No. 0071RD $49.95**

NEW!

MATH MASTER

MATH MASTER is an educational package designed to help your child understand the mathematical concepts of addition, subtraction, multiplication and division through problem solving. This package also instructs the student in fraction problem solving. MATH MASTER will "walk" your child through the developmental concepts of mathematics with never-ending patience. **Order No. 0257R $9.95**

WORDWATCH

Wordwatch consists of 4 different programs, each designed to enhance your child's understanding of word relationships—this results in an improved vocabulary. In WORD-RACE, the student must choose the proper definition for a given word. HIDE 'N SPELL asks the student to find misspellings. In SPELLING BEE, the student takes a pre-recorded quiz in which words are played aloud! Completing the package is SPELLING TUTOR, where words are jumbled, reversed or otherwise altered, and it's up to the student to straighten them out! Together, these four programs will help decrease dictionary dependency! **Order No. 0111R $7.95**

NEW!

OMNI-CALCULATOR

This package is a brilliant solution to the problems involving the complex world of different units of measure. It provides rapid means of conversion from one unit of measure to another in any of 10 categories: length, volume, mass, velocity, area density, power, energy, pressure/stress and temperature. Omni Calculator will give your child a great learning advantage, a head start in understanding the complex relationships between different units of measure. **Order No. 0211RD $19.95**

NEW!

THE ELEMENTS

This program can be used to introduce students to the periodic table of the elements, or for review by students and adults who want to refresh their memory in chemistry. It includes each of the elements' name, atomic number, weight and symbol, as well as its acid/base and normal physical state. Enrich your child's knowledge of science with the help of THE ELEMENTS. **Order No. 0216R $9.95**

LIFE

Even if you've only been involved with computers for a short while, you're sure to have heard of LIFE. This program is the computerized simulation of the life cycle of a colony of bacteria. It is based on a few simple concepts, but the results are captivating, animated graphics and an enlightening introduction into the world of biology and genetics. The LIFE program may be just the motivation your child needs to pursue an interest in the sciences. **Order No. 0078R $9.95**

TO ORDER: For the TRS-80*

See your local Instant Software dealer. If these packages are unavailable, order direct or

CALL TOLL FREE
1-800-258-5473

(We ship within 48 hours)

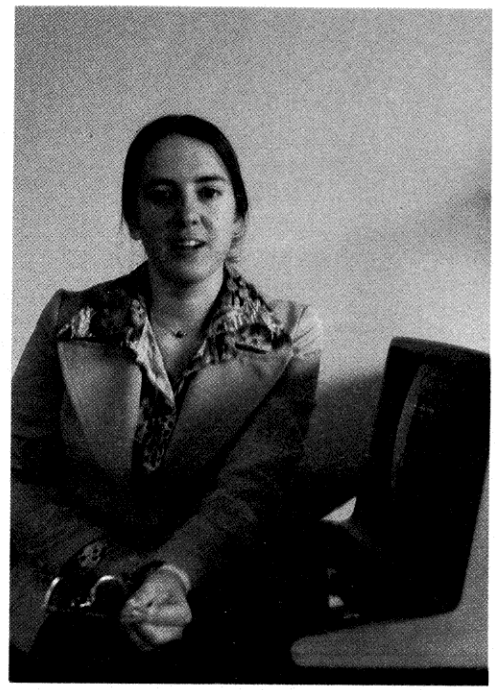
We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

"The microcomputer will be a powerful tool in education. One of its greatest advantages is its interactive nature—the student becomes an active participant in learning, and the computer can give immediate feedback. The student does not have to wait until the lesson is complete or the teacher is free to check his work; the computer can evaluate the work immediately, and reward him if it is correct or explain why if the work is incorrect. The computer can then determine, on the basis of his work, whether the student is ready to go on to the next lesson or needs to review the present one.

"Educational computer programs will be available for students at all levels—from pre-school to post-college, from remedial to gifted—and in any subject. These programs can give a child a headstart in school; they can reinforce and provide practice in concepts from hand-eye coordination to Math to English or even Health. A computer can individualize a program to a child's level and pace. Programs will challenge the gifted child, allowing him to advance at his own pace. Best of all, educational computer programs can make learning fun."



Mary Shooshan, Educational Software Editor and former teacher

*TRS-80 is a trademark of the TANDY CORPORATION.

Instant Software™

All packages are on cassette except for Geography Explorer: USA, Omni-Calculator and Teacher's Aide which are on disk.

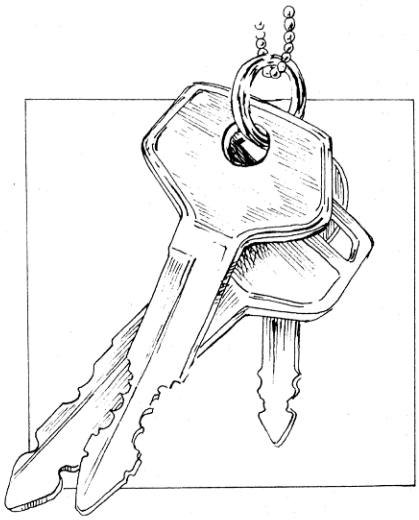
PETERBOROUGH, N.H. 03458
603-924-7296

See List of Advertisers on page 306

"What is the optimum way to spend my car money? The criteria are economic and this optimum is defined in economic terms."

The program will go through a loop that will call up the name of the item that the computer needs and allow the user to input the value. It is also a good idea to print the current value of the variable when we ask for it. This means that both the PRINT and INPUT statements must be used. The PRINT statement asks the question and displays the current value, and the INPUT statement gets the data.

What about errors? After we have gone through the data input loop and obtained all the data, let's clear the CRT and display it all. Now the program asks "Are these data



correct?" If not, then you can re-enter any corrections. If all data are correct control returns to the main program. Calculations cannot begin until you have answered "ARE THESE DATA CORRECT?" with "YES."

The program uses INKEY$ to get your answer. You need only answer Y or N. Pressing any other key repeats the question: please answer Y or N. Since there will be several times when we want a Y or N response. I built a small subroutine to get the Y or N response. This is a good subroutine to have around for other programs.

The module that calculates our equations is straightforward. Notice that the discount factor must be calculated for all of the cash flows. One way to calculate this is be means of the user-defined function in Level III or Disk BASIC. In this case we would write:

```
100 DEF FNDF(R,N) = (1 - (1/(1 + R)↑N))/R
```

Note that both R and N are dummy variables.

There are two disadvantages to using the user-defined function. First, we limit the transportability of the program to Level III and Disk BASIC users. Secondly, the case of R = 0 cannot be handled.

On the other hand a simple BASIC subroutine can handle the problem R = 0 and still be transportable to other computers. The subroutine would look like this:

```
1000 REM DISCOUNT FACTOR SUBROUTINE
1010 IF R = 0 THEN DF = N ELSE DF = (1 - (1/(1 + R)↑N))/R
1020 RETURN: REM END OF SUBROUTINE
```

To use this approach, R and N must be set by the calling program before the GOSUB instruction.

To display the results, first clear the CRT. Then, print the number of months to keep the old car. Next, the program asks the user if he wants to see detailed results. If so, the program displays a year at a time the value of keeping the old car and the various cost items for each month.

If you need a printed version, the CRT displays the input data, then prints it.

After everything is printed, or, even if you decline the hard copy, the program asks if you want to run another problem. If so control transfers back to the data input module. Otherwise, the programs ends.

Debugging

Program debugging is straightforward. Debug each module as it is written. Compare the calculated discount factors with published tables. When the entire program is written (and after each module has been debugged) test the extremes of data input. If a problem comes up, look for such things as a variable with a three-character name, lowercase in the string statements, bad logic in IF statements, bad input data or failure to convert percent. Most of the debugging should be simple because of the modular construction of the program.

We're done, right? Wrong! We need to document the program.

Program documentation should consist of two parts. A part for the user and a part for the programmer. They need different information about the program and it's up to us to provide it.

The user doesn't care how the program works. He needs to know how to run the program, what data is required, what the results mean and what other applications he has for the program—*without* modifying it.

The programmer needs to know how the program works so he can patch it, if necessary, or so he can customize it. He must know what special tricks you used, so he can translate the program to another computer that doesn't have the same features as yours.

Documentation

Program title: *Car Analysis* by L. E. Sparks

Abstract: This program calculates the optimum time to keep an old car before replacing it with a new, more fuel efficient car. The optimum time is defined as that time which maximizes the present value of keeping the old car. The program can also be used to analyze the economics of purchasing other fuel or energy efficient appliances.

Language: TRS-80 Level II or Disk BASIC.

Hardware: TRS-80 Level II Microcomputer with 16K RAM is minimum. Printer is op-

Name	Description
F VARIABLES	Strings used as labels
X(1)	Miles driven per year
X(2)&X(3)	Fuel price old and new
X(4)&X(5)	MPG old and new
X(6)&X(7)	Insur. old and new
X(8)&X(9)	Maint. old and new
X(10)	Trade in value old
X(11)&X(12)	Salvage value old and new
X(13)&X(14)	Life old and new
X(15)	Price new car
X(16)	Percent down required
X(17)	No. yrs of loan
X(18)	No. paymets per yr
X(19)&X(20)	Int. and discount rates
X(21)&X(22)	Excalation fuel old and new
X(23)	Escalation insur. and maint.
X(24)	Escalation new car price
X(25)	Income tax rate
X1-X4	Effective disc. rate monthly
DR	Monthly discount rate
DX	Fract. down
YM	Max. life old car
JM	Optimum life old car
VM	Max. present value old
M	No. car payments
L	Monthly loan rate
V(J)	NPV of old car for J mo.
TL(J)	Total cost of old for J mo.
TH(J)	Total cost of new for J mo.
XL(J)	Total fuel old for J mo.
XH(J)	Total fuel new for J mo.
N&R	Dummy variables
IL&IH	Monthly insur. costs
RL&RH	Monthly repair costs
Functions Used	
INKEY$	Get single character
LPRINT	Line printer command
CHR$(29)	Print normal letters
CHR$(28)	Print large letters
CHR$(140)	Top of form

Table 2. Symbol Table

tional.

User instructions: The program will analyze the economics of investing in a fuel efficient car as opposed to keeping your old car. The program calculates the present value of keeping the old car at the end for N months, where N varies from one to the remaining life of the old car. The time to replace the old car is at the end of the month with the highest present value. Note that if the present value is always negative, the time to replace the car is now.

- Documentation module
- Main program module (used to transfer control)
- Initialization module (used to initialize everything)
- Data input module (used to get data from keyboard)
- Calculation module
- Display module (used to display result on CRT)
- Line printer module (used to print results on printer)

Table 3. Program Structure Outline

To use the program load it into the computer, type RUN and press ENTER. In a few seconds the message CAR ANALYSIS BY LESLIE E. SPARKS VERSION 1.0 PLEASE ENTER THE DATA ASKED FOR. IF YOU MAKE A MISTAKE DON'T WORRY. YOU WILL HAVE A CHANCE TO CORRECT IT BEFORE CALCULATIONS START. will be displayed on the CRT. Enter the requested data and press ENTER after each item. If you make a mistake and find it before you have pushed ENTER, use the back arrow to correct it. Otherwise, keep going; you will have a chance to correct the error later.

After all of the data have been entered, they will be displayed in two blocks. You will be asked if the data are correct. If they are not, press N, and the program will allow you to re-enter any incorrect data. When all of the input data are correct, press Y. You cannot get into the calculation portion of the program until you have answered the question ARE THESE DATA CORRECT? by pressing Y.

As soon as you press Y, the computer starts calculating. The calculations take

Program Listing. Should I Buy a New Car?

```
10 REM SHOULD I BUY A NEW CAR? TRS-80 LEVEL II BY L.E.S
     PARKS
20 REM DISK FILE NAME CAR VERSION 1.0 3 MAY 1980
30 REM ALL F VARIABLES ARE STRINGS AND ARE USED FOR LAB
     ELS
40 REM X(1)=MILES DRIVEN PER YEAR,X(2)=PRICE OF FUEL OL
     D CAR
50 REM X(3)=PRICE OF FUEL NEW CAR,X(4)=MPG OLD,X(5)=MPG
      NEW
X(6)=INSURANCE OLD,X(7)=INSURANCE NEW,X(8)=MA
     INT OLD,
X(9)=MAINT NEW,X(10)=TRADE IN VALUE OLD,X
     (11)=SALVAGE VALUE OLD
X(12)=SALVAGE VALUE NEW,X(1
     3)=REMAINING LIFE OLD,X(14)=LIFE NEW
60 REM X(15)=PRICE NEW CAR, X(16)=%DOWN PAYMENT, X(17)=
      LIFE
OF LOAN, X(18)=PAYMENT PER YEAR,X(19)=INTER
     EST RATE,X(20)
DISCOUNT RATE, X(21)&X(22)=ESCLATIO
     N RATE FUEL PRICES OLD AND NEW
X(23)=ESCLATION INS
     UR&MAINT,X(24)=ESCLATION NEW CAR
70 REM X(25)=MARGINAL INCOME TAX RATE, X1-X4=EFFECTIVE
     MONTHLY
ESCLATION RATE IN FRACTION,DR=MONTHLY DISC
     OUNT RATE FRACTION,
DX=DOWNPAYMENT AS FRACTION,YM=
     MAX LIFE OLD CAR IN MONTHS, VM=
MAX NET PRESENT VA
     LUE OLD CAR
80 REM JM=OPTIMUM NUMBER OF MONTHS TO KEEP OLD CAR,M=NU
     MBER
OF CAR PAYMENTS, L=MONTHLY INTEREST RATE,TL(J
     )=TOTAL PRESENT
VALUE OF COST OF OLD CAR FOR J MON
     THS, TH(J) SAME FOR NEW CAR
90 REM XL(J)&XH(J) TOTAL PRESENT VALUE OF FUEL COSTS FO
     R OLD AND
```

Program continues

MORE FOR YOUR RADIO SHACK TRS-80 MODEL I !

★ **MORE SPEED**
10-20 times faster than Level II BASIC.

★ **MORE ROOM**
Compiled code plus VIRTUAL MEMORY makes your RAM act larger.

★ **MORE INSTRUCTIONS**
Add YOUR commands to its large instruction set!
Far more complete than most Forths: single & double precision, arrays, string-handling, more.

★ **MORE EASE**
Excellent full-screen Editor, structured & modular programming
Optimized for your TRS-80 with keyboard repeats, upper/lower case display driver, single- & double-width graphics, etc.

★ **MORE POWER**
Forth operating system
Interpreter AND compiler
Internal 8080 Assembler
(Z80 Assembler also available)
VIRTUAL I/O for video and printer, disk and tape
(10-Megabyte hard disk available)

MMSFORTH

THE PROFESSIONAL FORTH FOR TRS-80 MODEL I

(Over 1,000 systems in use)

MMSFORTH Disk System V1.9 (requires 1 disk drive & 16K RAM) . . . . . just **$79.95***
MMSFORTH Cassette System V1.8 (requires Level II BASIC & 16K RAM) **$59.95***

AND MMS GIVES IT PROFESSIONAL SUPPORT

Source code provided
MMSFORTH Newsletter
Many demo programs aboard
MMSFORTH User Groups
Programming staff can provide advise, modifications and custom programs, to fit YOUR needs.

THE DATAHANDLER V1.1, a very sophisticated database management system operable by non-programmers (requires Disk MMSFORTH, 1 drive & 32K RAM); with manuals. **$59.95***

MMSFORTH UTILITIES DISKETTE: includes FLOATING POINT MATH (L.2 BASIC ROM routines plus Complex numbers, Rectangular-Polar coordinate conversions, Degrees mode, more), plus a full Forth-style Z80 ASSEMBLER; plus a powerful CROSS-REFERENCER to list Forth words by block and line. All on one diskette (requires MMSFORTH, 1 drive & 16K RAM). **$39.95***

MMSFORTH GAMES DISKETTE: Real-time graphics and board games w/source code. Includes BREAKFORTH, CRASHFORTH, FREEWAY, OTHELLO, and TICTACFORTH (requires MMSFORTH, 1 drive & 32K RAM). **$39.95***

FORTH BOOKS AVAILABLE

MICROFORTH PRIMER (comes with MMSFORTH) separately **$15.00***
USING FORTH — more detailed and advanced than above **$25.00***
THREADED INTERPRETIVE LANGUAGES– advanced, excellent analysis of MMSFORTH-like language, ... **$18.95***
CALTECH FORTH MANUAL — good on Forth internal structure, etc **$10.00***
PROGRAM DESIGN and CONSTRUCTION — intro to structured program, good for Forth **$8.95***

* — Software prices include manuals and require signing of a single-system user license. Add $2.00 S/H plus $1.00 per additional book; Mass. orders add 5% tax. Foreign orders add 20%. UPS COD, VISA & M/C accepted; no unpaid purchase orders, please.

Send SASE for free MMSFORTH information. Good dealers sought.

Get MMSFORTH products from your computer dealer or ✓112

MILLER MICROCOMPUTER SERVICES (M5)
61 Lake Shore Road, Natick, MA 01760
(617) 653-6136

"A reasonable discount rate is the maximum interest or return that you can earn on a risk free investment."

several seconds.

As soon as the calculations are complete, the optimum time to keep your old car is displayed on the CRT along with the question DO YOU WANT DETAILS? Answer the question by pressing Y or N. You do not need to press ENTER. If you want the details, the results of the calculations for each month will be displayed, one year at a time. To go on to the next year press any key.

Regardless of how you answer the question about details, you will be asked DO YOU WANT HARD COPY? Again answer Y or N. If you want hard copy, the input data and all of the information that was displayed on the CRT will be printed.

The last question you will be asked is DO YOU WANT TO RUN ANOTHER PROBLEM? Answer Y or N as before. If you answer Y, you will find yourself back in the data input portion of the program. All of the data you used in the previous calculation is still in the computer. When you get in the data input loop, you will find these data in parenthesis. If you want to keep the value displayed, press ENTER; otherwise enter the new data. If you answer N, the program run will be terminated and control returned to BASIC as indicated by READY.

Although the program is specifically written to provide an answer to the new car question, it can analyze the economics of other investments involving a choice of keeping an old, less efficient device and replacing it with a new, energy efficient device. The input data have to be redefined but no programming changes are required.

Interpretation of results: The program uses present value as the criterion for determining the economic advisability of replacing the old car. The concept of present value is used in most investment analyses and is a way of comparing cash flows with different timing on a common basis. The sooner a dollar is received, the higher its present value is. The best investment is the one that maximizes the present value. Thus the optimum time to get rid of the old car is at the end of the month that has the highest present value. Note that if the present value of keeping the old car is always negative, the time to replace it is now.

The present value of a cash flow is a function of the discount rate used to calculate the present value. A reasonable discount rate is the maximum interest or return that you can earn on a risk free investment. The program uses a default of 10 percent per

```
NEW CARS FOR J MONTHS, IL&IH MONTHLY INS
     URANCE COSTS FOR OLD&NEW
100 REM RL&RH=MONTHLY REPAIR COSTS FOR OLD AND NEW CARS
110 REM DP(J)=PRESENT VALUE OF DOWNPAYMENT COST AT END
     OF J MO.
120 REM IP(J)=PRESENT VALUE OF CAR PAYMENTS FOR J MONTH
     S
130 REM TD TAX DEDUCTION FOR INTEREST
140 CLEAR 500:REM CLEAR STRING SPACE
150 GOTO 190  :REM TRANSFER TO MAIN PROGRAM
160 REM SUBROUTINE TO CALCULATE DISCOUNT FACTOR
170 IF R = 0 THEN DF=N ELSE DF = (1-(1/(1+R)[N))/R
180 RETURN
190 REM MAIN PROGRAM
200 GOSUB 350  :REM INITIALIZE
210 GOSUB 900  : REM GET INPUT DATA
220 GOSUB 1190 :REM DO CALCULATIONS
230 GOSUB 1790 : REM DISPLAY RESULTS
240 PRINT"DO YOU WANT HARD COPY?"
250 GOSUB 290  : REM GET INPUT FROM KEYBOARD
260 IF Y$ ="Y" THEN GOSUB 2050 :REM PRINT IT ON LINEPRI
     NTER
270 PRINT" DO YOU WANT ANOTHER CASE?"
280 GOSUB 290  : IF Y$="Y" THEN 210  ELSE END
290 REM SUBROUTINE TO GET Y OR N FROM KEYBOARD
300 Y$=INKEY$:IF Y$=""THEN 300
310 IF Y$ ="Y" OR Y$ ="N" THEN 340
320 PRINT"PLEASE ANSWER Y OR N"
330 GOTO 300
340 RETURN
350 REM INITIALIZE EVERYTHING
360 DEFSTR F
370 DEFINT J
380 DR=0:X1=0:X2=0:X3=0:X4=0:YM=0:VM=0:M=0:L=0:D=0:IL=0
     :J=0:IH=0
390 RL=0:RH=0:C=0:N=0:R=0:DF=0:IP=0:IK=0:REM INITIALIZE
      VARIABLES
USED LATER FOR SPEED
400 DIM X(25),F(25),V(120),TH(120),TL(120),IL(120),IH(1
     20),RL(120),RH(120),IP(120)
410 DIM XL(120),XH(120),DP(120)
420 F(1)="MILES DRIVEN PER YEAR"
430 X(1)=15000:X(2)=1.3:X(3)=1.3:REM SET UP DEFAULTS
440 F(2)="CURRENT PRICE OF FUEL FOR OLD CAR $/GAL"
450 F(3)="CURRENT PRICE OF FUEL FOR NEW CAR $/GAL"
460 F(4)="MILES PER GALLON OLD CAR"
470 X(4)=12
480 F(5)="MILES PER GALLON NEW CAR"
490 X(5)=40
500 F(6)="INSURANCE COST OLD CAR $/YR"
510 X(6)=150
520 F(7)="INSURANCE COST NEW CAR $/YR"
530 X(7)=350
540 F(8)="MAINTANENCE COST OF OLD CAR PER YEAR"
550 X(8)=250
560 F(9)="MAINTANENCE COST OF NEW CAR PER YEAR"
570 X(9)=100
580 F(10)="PRESENT TRADE IN VALUE OF OLD CAR"
590 X(10)=500
600 F(11)="SALVAGE VALUE OF OLD CAR"
610 F(12)="SALVAGE VALUE OF NEW CAR"
620 X(11)=500
630 F(13)="ESTIMATED REMAINING LIFE OF OLD CAR YEARS"
640 X(13)=4
650 F(14)="ESTIMATED LIFE OF NEW CAR YEARS"
660 X(14)=10
670 F(15)="PURCHASE PRICE OF NEW CAR $"
680 X(15)=9000
690 F(16)="% NEW CAR PRICE REQUIRED DOWN PAYMENT"
700 X(16)=10
710 F(17)="LIFE OF LOAN, YEARS"
720 X(17)=3
730 F(18)="NUMBER OF LOAN PAYMENTS PER YEAR "
740 F(19)="YEARLY INTEREST RATE %"
750 X(18)=12:X(19)=14:X(20)=10
760 F(20)="RISK FREE RETURN ON BEST INVESTMENT % YR"
770 F(21)="ESCLATION RATE FOR FUEL PRICE FOR OLD CAR %/
     YR"
780 F(22)="ESCLATION RATE FOR FUEL PRICE FOR NEW CAR %/
     YR"
790 F(23)="ESCLATION RATE FOR MAINTANENCE AND INSURANCE
      %/YR"
```

Program continues

When DecisionMaster™ speaks everybody listens.

Let's face it. We all have to make decisions. Decisions that can change our lives. Decisions that can make us happy or unhappy. Decisions that could win us fame or fortune. Now, DecisionMaster can help you make the best decisions of your life.

Use Bayesian theory to peer into the future...even if you've never heard of the Bayes' Rule. Do a complete weighted factor analysis...without knowing what one is. Use discounted cash flow to compare investment alternatives without bothering with present value tables. These and other sophisticated theories that were once the exclusive domain of professors and top business executives are *built into* DecisionMaster's algorithms... so you can use them at the touch of a key!

DecisionMaster is easy to use. It features:

- A fully documented manual developed by an authority in the field.
- A unique program-controlled cross reference system.
- A powerful formatted-screen data entry system.

You'll use DecisionMaster in hundreds of routine decisions, as well as more important ones such as • Buying a house • Changing jobs • Selecting investment • Evaluating insurance policies • Expanding product lines • Leasing vs. purchasing.

If you buy only one computer program this year, make it DecisionMaster. And when it speaks, *listen*.

DECISION?MASTER™

✓302

To order, see your software dealer or return this form with your check to: DecisionMaster, Dept. 80, 10428 Westpark, Houston, Texas 77042 Add $1.50 for shipping and handling

Diskette for: ☐ Apple II* (32K) $29.95 ☐ TRS-80** (Level II-32K) $29.95 ☐ TRS-80** (Model III) $39.95

Name

Address

City State Zip

CHARGE by phone toll-free: **1-800-231-5768 Ext. 306** **(In Texas: 1-800-392-2348)** or return this form:

☐ VISA ☐ MasterCard Bank Code

Account No.

Signature

Expiration Date

*Apple II is a registered trademark of Apple Computers, Inc.
**TRS-80 is a trademark of the Radio Shack Division of Tandy Corp.

OURS WORK!

ACCOUNTING PROGRAMS

from the company with years of experience on small computers and thousands of customers

prices resulting from volume sales

PACKAGE OF 5 PRODUCTS **$395.**

PRODUCTS EACH **$95.**

MANUALS EACH **$20.**

GENERAL LEDGER
PAYROLL
ACCOUNTS RECEIVABLE
ACCOUNTS PAYABLE
DEPRECIATION

for

TRS-80*
MODEL I with TRSDOS*
MODEL II with CP/M†

OTHER CP/M† SYSTEMS

Product Info & License/Order Form.
FROM.....

DATA TRAIN INC.

PHONE ✓44
(503) 476-1467
840 N.W. 6th STREET, SUITE 3
GRANTS PASS, OREGON 97526

*Trademark Radio Shack, Div. Tandy Corp.

†Product Digital Research, Inc.


```
800 F(24)="ESCLATION RATE FOR NEW CAR PRICE % PER YEAR"
810 F(25)="yOUR MARGINAL INCOME TAX RATE"
820 X(21)=8:X(22)=8:X(23)=4:X(25)=00:X(24)=5
830 REM NOTE THAT THE DEFAULT VALUES ARE THE SAME AS TH
     E EXAMPLE
840 REM NOTE THAT THE EXAMPLE IGNORES INCOME TAXES IF Y
     OU RUN
    THE EXAMPLE WITH A 50% TAX RATE THE TIM
     E TO REPLACE THE CAR IS NOW
850 F1="THE FIRST 12"
860 F2="tHE FINAL GROUP CHECK CAREFULLY"
870 J1=1
880 J2 = 12
890 RETURN
900 REM INPUT DATA
910 CLS:PRINT"CAR ANALYSIS BY LESLIE E. SPARKS VERSION
     1.0"
920 PRINT"PLEASE ENTER THE DATA ASKED FOR"
930 PRINT"DO NOT WORRY IF YOU MAKE A MISTAKE"
940 PRINT"YOU WILL HAVE A CHANCE TO CORRECT THE MISTAKE
      LATER."
950 PRINT"THE CURRENT VALUE OF THE VARIABLE IS SHOWN IN
      ()"
960 FOR J= 1 TO 25
970     PRINT F(J);"(";X(J);")";
980     INPUT X(J)
990 NEXT J
1000 J1=1:J2=12:F=F1
1010 CLS
1020 PRINT F
1030 FOR J=J1 TO J2
1040     PRINT J;" ";F(J);X(J)
1050 NEXT J
1060 PRINT"ARE THESE CORRECT"
1070 GOSUB 290
1080 IF Y$="Y" THEN 1140 ELSE INPUT"WHAT ITEM NUMBER DO
      YOU WANT TO CHANGE ";JC
1090 IF JC < J1 OR JC>J2 PRINT" i CAN'T CORRECT THAT ON
     E" ELSE 1120
1100 FOR JJ= 1 TO 800:NEXTJJ
1110 GOTO1010
1120 INPUT"ENTER CORRECT VALUE ";X(JC)
1130 GOTO1010
1140 IF J1>1 THEN RETURN ELSEF=F2
1150 J1 = J2+1
1160 J2=25
1170 PRINT F
1180 GOTO1010
1190 REM SUBROUTINE TO CALCUALTE PRESENT VALUE OF KEEPI
     NG OLD CAR V(J)
1200 REM SET UP EFFECTIVE DISCOUNT RATES
1210 DR=X(19)/12/100:REM MONTHLY DISCOUNT RATE DECIMAL
     FRACTION
1220 X1=DR-(X(22)/12/100):REM EFFECTIVE RATE FOR OLD CA
     R FUEL
1230 X2=DR-(X(23)/12/100):REM EFFECTIVE RATE FOR NEW CA
     R FUEL
1240 X3=DR-(X(23)/12/100):REM EFFCTIVE RATE FOR INSUR A
     ND MAINT
1250 X4=DR-X(24)/12/100:REM EFFECTIVE RATE FOR NEW CAR
1260 DX=X(16)/100
1270 YM=12*X(13):REM MAX LIFE OF OLD CAR IN MONTHS
1280 VM=0:REM INITIALIZE MAX VALUE
1290 M=X(17)*X(18):REM NUMBER OF LOAN PAYMENTS
1300 L=X(16)/12/100:REM MONTHLY INTEREST RATE FOR LOAN
1310 D=X(1)/12:REM MONTHLY MILES DRIVEN
1320 IL=X(6)/12:REM MONTHLY INSURANCE FOR OLD CAR
1330 IH=X(7)/12:REM MONTHLY INSRUANCE FOR NEW CAR
1340 RL=X(8)/12:REM MONTHLY MAINT. FOR OLD CAR
1350 RH=X(9)/12:REM MONTHLY MAINT. FOR NEW CAR
1360 C=X(15):REM COST OF NEW CAR
1370 SH=1-(X(15)-X(12))/X(15):REM SALVAGE VALUE AS FRAC
     TION OF PRICE
1380 SL=(X(11)-X(10))/X(10)/(X(13)*12):SL=S-SL
1390 REM NOW START CALCULATIONS
1400 CLS:PRINT "STARTING CALCULATIONS NOW "
1410 FOR J=1 TO YM+1
1420       REM CALCULATE ALL COSTS FOR OLD CAR
1430       N=J:R=X1
1440       GOSUB160
1450       XL(J)=D*X(2)/X(4)*DF
```

Program continues

"The program is broken into modules—documentation, initialization, data input, calculation, CRT display, and hard copy."

year.

Sample problem: The input data are as follows.

miles driven = 15000 miles per year.
miles per gallon old car = 12
miles per gallon new car = 40
price of fuel for old car = $1.30 per gallon
price of fuel for new car = $1.30 per gallon
escalation rate for fuel = 8 percent per year for both old and new cars
normal maintenance for old car = $350 per year
normal maintenance for new car = $250 per year
insurance for old car = $150 per year
insurance for new car = $350 per year
escalation rate for maintanence and insurance = 4.0 percent per year
price of new car = $9000
down payment = 10 percent of purchase price
escalation rate for new car price = 5.0 percent per year
interest rate = 14 percent per year
number of years of loan = 3
number of payments per year = 12
discount rate = 10 percent per year
trade-in value of old car = $500
salvage value of old car = $0
salvage value of new car = $0

See Fig. 1 for the results of the example.

The program: The program is broken into modules—documentation, initialization, data input, calculation, CRT display, and hard copy. Communication between modules is handled by a small main program.

The documentation module consists of remark statements only. The purpose of this module is to provide minimum documentation of the program. It contains the program title, version number, author, and a variable list. All of these lines except the credit line can be removed from a working program.

The initialization module clears string space, sets up the arrays, and provides labels for data input and out strings. If investments other than the car example are to be analyzed, the labels can be changed to reflect the new data requirements. In general, no other changes will be required in the program.

Data are entered from the keyboard using INPUT. The program goes through a loop where the data are asked for by item name. The current value of the variable is shown in parenthesis.

The calculation module is also straightforward. If your BASIC allows user-defined functions, they can be used to calculate the discount factor. The discount factor for a series of equal payments is calculated in a subroutine. The equations which are solved by the program are shown in Table 1.

The CRT display module is straightforward and requires no comment.

```
1460      R=X3
1470    GOSUB160
1480    IL(J)=DF*IL
1490    RL(J)=DF*RL
1500    TL(J)=XL(J)+IL(J)+RL(J)
1510    R=X2
1520    GOSUB160
1530    XH(J)=D*X(3)/X(5)*DF
1540    R=X3
1550    IH(J)=IH*DF
1560    RH(J)=RH*DF
1570   N=J:R=X4
1580   GOSUB160
1590   CC=C*X4*DF*(1+(1-SH)/((1+X4)[(12*X(14))-1))
1600   CC=CC-X(10)*(1-(1+SL)[-N)
1610    DP(J)=CC*DX
1620   R=L:N=M:GOSUB160
1650   IP=CC*(1-DX)/DF
1660    R=DR
1680    GOSUB160
1690   IP=IP*DF
1700    IP(J)=IP
1710 N=M:R=L:GOSUB160  :D1=1/DF:R=DR-L:GOSUB160  :D2=1/
     DF
1720   TD=X(25)/100*(IP-(1-DX)*CC*(D1-L)/((1+L)*D2))
1730    TH(J)=IP(J)+XH(J)+IH(J)+RH(J)-TD
1740    V(J)=TH(J)-TL(J)
1750    IF V(J)>VM THEN VM=V(J) ELSE 1770
1760    JM=J
1770 NEXTJ
1780 RETURN
1790 REM SUBROUTINE TO DISPLAY RESULTS ON THE CRT
1800 CLS
1810 PRINT"   CAR ANALYSIS BY LESLIE E. SPARKS VERSION
     1.0"
1820 PRINT
1830 PRINT@240," "
1840 IF VM<=0 THEN PRINT TAB(20)"THE TIME TO GET A NEW"
     :PRINT TAB(20)"CAR IS NOW!!!" ELSE 1860
1850 GOTO 1880
1860 PRINT TAB(20)"THE TIME TO GET A NEW CAR IS IN ";JM
     ;" MONTHS"
1870 PRINT
1880 PRINT:PRINT:PRINT:PRINT"DO YOU WANT TO SEE DETAILS
     ?"
1890 GOSUB290
1900 IF Y$="Y" THEN 1910 ELSE RETURN
1910 CLS
1920 PRINT "DETAILS OF CALCULATIONS "
1930 J=0
1940 FOR JJ=1 TO YM/12
1950 CLS
1960 PRINT"MONTH    VALUE";TAB(19);"TL";TAB(28);"TH";TA
     B(37);"FUEL SAVINGS"
1970    FOR JK = 1 TO 12
1980 J=J+1
1990    PRINT J;TAB(9)V(J);TAB(17);TL(J);TAB(28);TH(J);
     TAB(38);XH(J)-XL(J)
2000  NEXT JK
2010 PRINT"PRESS ANY KEY FOR NEXT YEAR"
2020 Y$=INKEY$:IF Y$=""THEN 2020
2030 NEXT JJ
2040 RETURN
2050 REM LINE PRINTER SUBROUTINE
2060 LPRINT:LPRINT:LPRINT:LPRINT:LPRINT:REM IF YOU HAVE
      RADIO SHACK PRINTER CHANGE TO LPRINT" ":LPRINT" "
     :LPRINT" "
2070 LPRINT TAB(10) STRING$(68,"$")
2080 REM FIRST PRINT OUT INPUT DATA
2090 LPRINT TAB(30)CHR$(28);"CAR ANALYSIS";CHR$(29)
2100 LPRINT TAB(10)STRING$(68,"$")
2110 LPRINT TAB(30) CHR$(28);"INPUT DATA";CHR$(29): REM
      LARGE PRINT THEN SMALL PRINT
2120 FOR J=1TO25
2130    LPRINT TAB(10)  F$(J);TAB(60)"        ";X(J)
2140 NEXT J
2150 LPRINT:LPRINT:LPRINT
2160 LPRINT TAB(10)STRING$(68,"$")
2170 IF VM<=0 THEN LPRINT TAB(10) CHR$(28);"THE TIME TO
      GET A NEW CAR IS NOW!";CHR$(29):GOTO2230
2180 LPRINT TAB(10)"THE TIME GO GET A NEW CAR IS ";JM;"
      MONTHS"
```

Program continues

"INKEY$ allows the user to enter a single character from the keyboard without pressing enter."

The line printer module uses two commands peculiar to the Microtek MT-80P printer—LPRINT CHR$(28); (large characters) and LPRINT CHR$(29); (normal characters) to control the character size. If your printer allows software control of character size, replace these two commands with the appropriate commands for your printer. If not, delete these two commands.

There are several times when the user is asked to answer a question either Y or N. The user's answer to these questions is handled with INKEY$. INKEY$ allows the user to enter a single character from the keyboard without pressing enter. If your BASIC does not support this type of command, replace it with a normal INPUT command.

A variable list and function table are given in Table 2.

Note that in the program listing the bracket appears. This is the character that the printer uses for the up arrow. ■

```
2190 LPRINT
2200 LPRINT TAB(10)"ON THE NEXT PAGE VALUE IS THE NET P
     RESENT VALUE OF REPLACING THE
2210 LPRINT TAB(10)"OLD CAR J MONTHS FROM NOW INSTEAD O
     F NOW"
2220 LPRINT TAB(10)"TC(OLD) IS THE PRESENT VALUE OF THE
      COST OF THE OLD CAR FOR J MONTHS
";TAB(10);"TC(NE
     W) IS THE SAME FOR THE NEW CAR AND FUEL(OLD)-FUEL(
     NEW) IS
";TAB(10);"THE SAVING IN FUEL THAT RESULT
     FROM REPLACING THE OLD CAR NOW."
2230 LPRINTCHR$(140):REM GET NEW PAGE
2240 REM NOTE YOUR PRINT MAY USE A DIFFERENT COMMAND FO
     R TOP OF FORM.
2250 LPRINT
2260 LPRINT TAB(5)STRING$(68,"$")
2270 LPRINTTAB(5) CHR$(28);"DETAILED RESULTS OF THE CAL
     CULATIONS":REM LARGE PRINT
2280 LPRINTCHR$(29);TAB(5) STRING$(68,"$")
2290 LPRINTCHR$(29);TAB(5)"MONTH";TAB(15);"VALUE";TAB(2
     6);"TC(OLD)";TAB(43);"TC(NEW)" ;TAB(58);"FUEL(OLD)
     -FUEL(NEW)
2300 LPRINT TAB(5)STRING$(68,"$")
2310 FOR J= 1 TO YM
2320    LPRINT TAB(5) J;TAB(12)V(J);TAB(26);TL(J);TAB(4
     0)TH(J);TAB(60);XL(J)-XH(J)
2330 NEXT
2340 RETURN
```


CONVERT YOUR SERIAL PRINTER TO PARALLEL

NEW MODEL UPI-3 SERIAL PRINTER INTERFACE MAKES IT POSSIBLE TO CONNECT AN ASCII SERIAL PRINTER TO THE PARALLEL PRINTER PORT ON THE TRS-80.

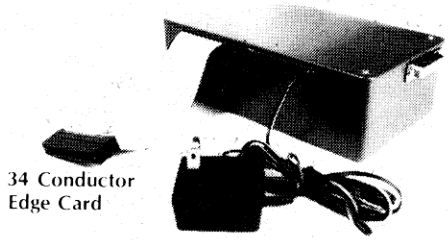
Software compatibility problems are totally eliminated because the TRS-80 "THINKS" that it has a parallel printer attached. NO MACHINE LANGUAGE DRIVER NEEDS TO BE LOADED INTO HIGH MEMORY BECAUSE THE DRIVER ROUTINE FOR THE UPI-3 IS ALREADY IN THE LEVEL II ROM! SCRIPSIT, PENCIL, RSM 2, ST80D, NEWDOS, FORTRAN, BASIC etc. all work as if a parallel printer was in use.

The UPI-3 is completely self contained and ready to use. A 34 conductor edge card connector plugs onto the parallel printer port of the model I Expansion Interface or onto the parallel printer port on the TRS-80 III. A DB25 socket mates with the cable from your serial printer. The UPI-3 converts the parallel output of the TRS-80 printer port into serial data in both the RS232-C and 20 MA. loop formats.

SPEEDWAY ELECTRONICS
1354 AUBURN ✓275
SPEEDWAY, IN 46224

Also available from
YE ODDE SHOPPE
(317) 925-0496

VISA MasterCard



Switch selectable options include:
- Linefeed after Carriage Return
- Handshake polarity (RS232-C)
- Nulls after Carriage Return
- 7 or 8 Data Bits per word
- 1 or 2 Stop Bits per Word
- Parity or No parity
- ODD or EVEN Parity

Price is $139.95 plus $4.00 shipping US, $15.00 Foreign. SPECIFY BAUD RATE 110 TO 4800 WHEN ORDERING. The manual for the UPI-3 is available for $5.00 postpaid.

Our printer interface for the H14 is still available at $29.95 plus $2.00 S&H. Installation requires soldering. See ad Oct 80 p. 189

A calculating utility for those trying to put a roof over their heads.

The Home Buyer's Helper

Clarence Stinson
17315 Ruette Abeto
San Diego, CA 92127

With mortgage interest rates fluctuating as they are, what will it cost you to buy a home? Your TRS-80 can become your home buyer's calculator. With this program you can estimate the monthly mortgage payments and closing costs at interest rates varying from nine to eighteen percent.

It is surprising the difference interest rates make in a mortgage payment; you would do well to run estimates at home before confronting a realtor. Find the price range of houses that appeal to you, the range of interest rates, required down payments, loan lengths, property taxes, etc. Punch these figures into the TRS-80, as shown in Example 1, and see the results, as in Example 2.

Don't like what you see? Try different inputs: a lower interest rate; higher down payment; extended loan. You probably won't find a painless solution, but you'll go house hunting with a better knowledge of the options.

IRS to the Rescue

The Internal Revenue Service is usually cast as the villain in the drama of the average guy's economic life. The Home Buyer's Calculator can recast it in the role of hero when you are considering a home of your own. By itemizing your deductions you can receive a rebate each year based on your annual mortgage interest, property taxes and your current tax bracket. The higher each of these items is, the more the rebate! The Home Buyer's Calculator estimates the total rebate you can expect. It also figures the rebate as a deduction from your monthly mortgage payment to help you see what you will actually be paying.

Fill in the Blanks

Make a trial run through the program. Example 1 illustrates the first screen display, with questions to be answered. Interest rate must represent a fraction of a percent in decimal form. The program includes (lines 650–710) tables of monthly payments per $1000 for percentages ranging from nine to eighteen percent. The tables come from the standard realtors *Blue Book* and cover 20, 25 and 30 year loans. The program interpolates fractional percentages.

Estimating real estate taxes will vary with your locale. Closing costs are also variable and include such things as escrow fee, credit report, property inspection, etc. A ballpark estimate of one to 1.5 percent is reasonable, unless the buyer is required to pay points to obtain a loan. In that case, add the points (one point = one percent) to the normal closing cost.

After entering the last item in Example 1, there is a pause, then the screen shown in

```
Calculate the monthly mortgage payments and
closing costs.
Enter the values requested.
On repeat runs, if the value in unchanged, simply
press 'ENTER'.
Sale Price? 60000 *
Down Payment? 6000
Interest Rate (9-18)? 11.25
Number of Years for Loan (20, 25, 30)? 25
Annual Real Estate Taxes? 600
Closing Cost as % of Sale Price? 1
```

**User inputs are underlined.*

Example 1. Menu for Home Buyer's Calculator

```
Calculate the monthly mortgage payments and
closing costs.
Sale Price                          60,000.00
Loan Amount                         54,000.00
Interest Rate                           11.25
Principle & Interest                   539.59
Taxes                                   50.00
Hazard Insurance                        10.95
* Total Monthly Payment *              600.54

Down Payment                          6000.00
Tax Impound (6 months)                 300.00
Insurance Impounds (12 months)         131.40
Closing Costs                          540.00
* Total Cash Required *               6,971.40
```

Example 2. Calculation of Monthly Payment and Cash Required

```
Estimated IRS Rebate Based on the Following:
  —Current Property Tax
  —Average Mortgage Interest for First 5 Years
  —Your Current Tax Bracket
Enter following values from IRS Form 1040:
Adjusted Gross Income (line 31)? 21000
Itemized Deductions (line 33) or 0? 3850
Total Income Tax (line 37)? 2460
```

Example 3. Input for Income Tax Rebate

```
Estimated Annual IRS Rebate           938.28
Monthly Mortgage Payment              600.54
Estimated Monthly IRS Rebate           78.19
Net Monthly Mortgage Payment          522.35
```

Example 4. Calculation of IRS Rebate

```
10 REM HOME BUYER'S CALCULATOR
20 REM AUTHOR: C.J.STINSON, MAY 1980
30 CLEAR:E$="###,###.##"
40 DEFINT H,J,K
50 CLS:PRINT TAB(15)"*** HOME BUYER'S CALCULATOR ***":PRINT
60 PRINT"CALCULATE THE MONTHLY MORTGAGE PAYMENTS AND CLOSING COST."
70 PRINT"ENTER THE VALUE REQUESTED."
80 PRINT"ON REPEAT RUNS,IF THE VALUE IS UNCHANGED, SIMPLY PRESS 'ENTER'."
90 PRINT:INPUT"SALE PRICE";S
100 INPUT"DOWN PAYMENT";D
110 L=S-D
120 INPUT"INTEREST RATE (9-18)";I
130 IF I<9 GOTO 150
140 IF I<=18 GOTO 160
150 PRINT"INVALID":GOTO 120
160 INPUT"NUMBER OF YEARS FOR LOAN (20,25,30)";Y
170 IF Y=20 THEN Z=0:GOTO 210
180 IF Y=25 THEN Z=10:GOTO 210
190 IF Y=30 THEN Z=20:GOTO 210
200 PRINT"INVALID":GOTO 160
210 GOSUB 730
220 INPUT"ANNUAL REAL ESTATE TAXES";T
230 INPUT"CLOSING COST AS % OF SALE PRICE";C
240 CLS:PRINT"SALE PRICE";TAB(30)USINGE$;S
250 PRINT"LOAN AMOUNT";TAB(30)USINGE$;L
260 PRINT"INTEREST RATE";TAB(30)USINGE$;I
270 PRINT"PRINCIPLE & INTEREST";TAB(30)USINGE$;M
280 TX=T/12:PRINT"TAXES";TAB(30)USINGE$;TX
290 N=.00219*S/12
300 PRINT"HAZARD INSURANCE";TAB(30)USINGE$;N
310 TT=M+TX+N:PRINT"* TOTAL MONTHLY PAYMENT *";TAB(30)USINGE$;TT
320 PRINT:PRINT"DOWN PAYMENT";TAB(30)USINGE$;D
330 PRINT"TAX IMPOUND (6 MONTHS)";TAB(30)USINGE$;TX*6
340 PRINT"INSURANCE IMPOUND (12 MONTHS)";TAB(30)USINGE$;N*12
350 CC=C/100*L:PRINT"CLOSING COST";TAB(30)USINGE$;CC
360 TM=N*12+TX*6+CC+D
370 PRINT"* TOTAL CASH REQUIRED *";TAB(30)USINGE$;TM
380 INPUT"PRESS 'ENTER' TO CONTINUE.";A$
390 PRINT"TO REPEAT THE HOME-BUYER'S CALCULATOR ENTER (H)."
400 INPUT"TO ESTIMATE INCOME TAX REBATE ENTER (R).";A$
410 IF A$="H" GOTO 50
420 IF A$<>"R":PRINT"INVALID":GOTO 390
430 CLS:PRINT TAB(15)"*** INCOME TAX REBATE ***":PRINT
440 PRINT"ESTIMATED IRS REBATE BASED ON THE FOLLOWING:"
450 PRINT"   -CURRENT PROPERTY TAX
460 PRINT"   -AVERAGE MORTGAGE INTEREST FOR FIRST 5 YEARS"
470 PRINT"   -YOUR CURRENT TAX BRACKET.":PRINT
480 PRINT"ENTER FOLLOWING VALUES FROM IRS FORM 1040:"
490 INPUT"ADJUSTED GROSS INCOME (LINE 31)";B
500 INPUT"ITEMIZED DEDUCTIONS (LINE 33) OR 0";DE
510 INPUT"TOTAL INCOME TAX (LINE 37)";IT
520 BD=B-DE:PC=IT/BD:LL=L:PP=0:AA=0
530 FOR H=1 TO 60
540 AI=LL*I/1200:AA=AA+AI
550 PP=M-AI:LL=LL-PP:NEXT H
560 AA=AA/5+T 'AVERAGE ANUALNUAL INTEREST & TAX
570 AR=AA*PC 'ANNUAL REBATE
580 CLS:PRINT"ESTIMATED ANNUAL IRS REBATE";TAB(30)USINGE$;AR
590 PRINT:PRINT"MONTHLY MORTGAGE PAYMENT";TAB(30)USINGE$;TT
600 PRINT"ESTIMATED MONTHLY IRS REBATE";TAB(30)USINGE$;AR/12
610 PRINT TAB(30)"  -------"
620 PRINT"NET MONTHLY MORTGAGE PAYMENT";TAB(30)USINGE$;TT-AR/12
630 PRINT:INPUT"PRESS 'ENTER' TO CONTINUE";A$
640 GOTO 50
650 REM MONTHLY PAYMENTS PER $1000 FOR 9% TO 18%
660 DATA 9.00,9.66,10.33,11.02,11.72
670 DATA 12.44,13.17,13.92,14.59,15.44
680 DATA 8.40,9.09,9.81,10.54,11.28
690 DATA 12.04,12.81,13.59,14.38,15.18
700 DATA 8.05,8.78,9.53,10.29,11.07
710 DATA 11.85,12.65,13.45,14.26,15.08
720 REM CALCULATE MONTHLY PAYMENT
730 RESTORE:J=I:K=J-8+Z
740 FOR H=1 TO K:READ M:NEXT H
750 ID=I-J:IF ID=0 GOTO 770
760 READ N:M=(N-M)*ID+M
770 M=L/1000*M:RETURN
```

Program Listing

Example 2 appears. It presents the estimated monthly mortgage payment and the total cash required to purchase the house. The hazard insurance (or home-owner's insurance) was an average for my area. If it isn't appropriate for your area, change the constant in line 290.

If you have a printer and want to list the information instead of displaying it on the screen, change all the PRINT commands to LPRINT in lines 240-370. After printing or copying the totals for reference, you can repeat the first part of the program with different values or you can calculate your income tax rebate. On repeat runs, if the value is unchanged, simply press ENTER.

Form 1040

In the last part of the program, the savings you can expect from the IRS are calculated on the average mortgage interest and taxes fo the first five years of home ownership, multiplied by the percent of your income you paid for income tax last year.

Three items are required from your latest IRS Form 1040: adjusted gross income, itemized deductions (if taken) and total income tax paid. The line numbers refer to Form 1040. If you used the short form (1040A), use the values from the corresponding lines, and of course there are no itemized deductions.

Calculating the income tax rebate can only be an estimate because of all the variables. This exercise is particularly revealing to those who are not yet home owners and therefore probably do not itemize their deductions. If you already use the homeowner's deduction, you are of course aware of the savings, but it is interesting to see the effect it has on your monthly mortgage payments. ■

Four New Programs for May To Keep You Busy Till June!

"Deadlines, deadlines! Don't they realize I'm on a collision course with what must be the biggest ASTEROID in the galaxy?! 'Statistics,' they say. That's what we'll all BE if I can't fend off all these SPACE INVADERS! They're clamoring for reports when it's up to me to intercept enemy Gnat fighters, who are determined to strangle our deep space trade routes! With BALL TURRET GUNNER, any moment could be my last! And if that's not enough, I'm surrounded by Quelon Fighter escorts in COSMIC PATROL . . . and the Quelons never miss! Reports! Statistics! Deadlines! I guess some people just have no sense of priority."

Cosmic Patrol

The Cosmic Patrol program puts you in command of a small interstellar patrol craft. Your mission is to defend Terran space and prey on the Quelon supply ships. Beware of the I-Fighter Escorts—they're armed, fast, and manned by intelligent robots linked to battle computers. . . they NEVER miss! With its fast, real-time action, impressive sound option and superb graphics, COSMIC PATROL is the best program of its kind.

Order No. 0223R tape $14.95 Requires Level II 16K
0224RD disk $19.95 Requires Level II 16K

Invaders

The INVADERS are coming! Earth's defenses are all dead except for your laser base. Your assignment is to destroy the approaching invaders. Before Earth's sensors failed, they detected 550 armed invaders in space, speeding toward us in 10 attack formations of 55 each. The sensors detected four different types of attack crafts—large, medium, small and a short profile craft which is the most difficult to destroy. If you can't stop the attacks, Earth is doomed!!

Order No. 0240R tape $9.95 Requires Level II 4K

Asteroid

It's up to you to destroy any asteroids in your sector and to prevent alien spacecraft from infiltrating the Terran Defense Network. Your ship is equipped with an anti-matter cannon. You can shoot large asteroids, but this will shatter them into smaller pieces, each capable of destroying your ship. In addition, alien ships can make instantaneous hyperspace jumps into your area to fire on your ship. You'll need nerves of steel to survive ASTEROID. . . we have no need for non-survivors.

Order No. 0237R tape $14.95 Requires Level II 16K
Order No. 0247RD disk $19.95 Requires Level II 16K

Ball Turret Gunner

Imagine yourself at the control console of the LW 1417 Stratoblazer, ready for the onslaught of enemy GNAT fighter planes. Your Hindsight Director informs you that a GNAT fighter is closing fast. With your finger tensed over the firing key, you'll have only seconds to react. Suddenly, you see the fire command. With one beam, the Gnat fighter is reduced to an expanding ball of ionized gas. Mission accomplished. BALL TURRET GUNNER with your choice of multiple level of difficulty, optional sound effects and superb graphics, is more than a game—it's an adventure. Experience it!

Order no. 0051R tape $9.95 Requires Level II 16K.

✓2

Instant Software™

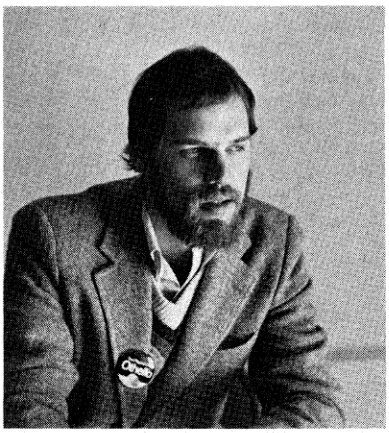
PETERBOROUGH, N.H. 03458

To Order: See your local Instant Software dealer. If these programs are unavailable, order directly.

Call Toll-Free
1-800-258-5473

✓See List of Advertisers on page 306

Success Talks.



"I particularly liked the help I received in rounding out the edges of my program . . . made it more marketable."

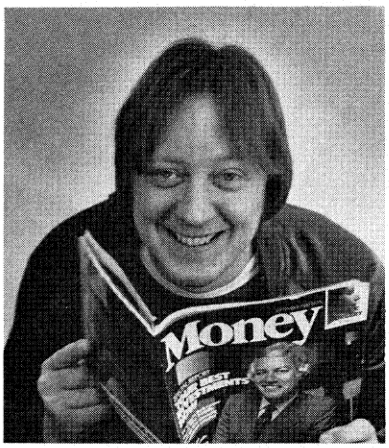
Charlie Heath
Author of the top microcomputer version of Othello, which recently beat all other microcomputer opponents in the Santa Cruz Open.

"They (Instant Software) *have the largest marketing organization, other than Tandy. This gives my program more exposure . . . and more sales."*

Terry Kepner
Author of ONE "D" MAIL-LIST, and numerous articles in the Industry's top magazines.

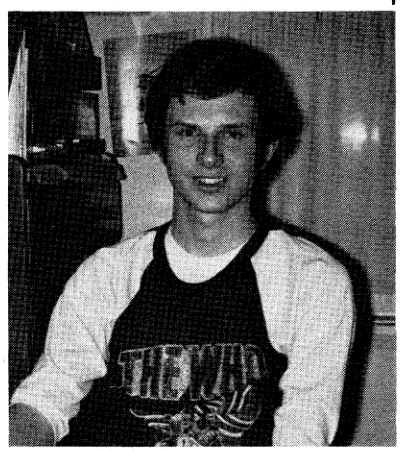
"As a European programmer, I can safely say that Instant Software, with its vast marketing and distribution network, has proven to me to be the best organization in the world to submit my TRS-80 utility programs to."

Jake Commander
Author of over 10 top selling utility programs, and many articles on advanced computer programming techniques.



"One thing I've been impressed with is the scale of your Marketing capabilities. So many dealers . . . so many advertisements."

Mike Wall
Author of the best selling ASTEROIDS and COSMIC PATROL . Soon to be a Computer Science major at M.I.T.



These four Instant Software authors have all written programs proven successful in the marketplace. Now it's your turn.

If you're a programmer and are writing what you feel to be an exceptional software program, it's time to think about bringing it to market.

We believe it takes time, talent, training and experience to write good software. It also takes time, talent, training, experience and money to establish an effective marketing system. YOU have the first set of qualifications; WE have the second. Together, we can team up successfully to bring your program to market.

So, what's in this for you? Excellent royalty percentage, paid monthly. 26 sales reps covering the United States with only one objective—to sell your programs. 22 distributors located worldwide with the same sole objective. Over 450 Instant Software dealers in the US. Hundreds of thousands of catalogs, mailed directly to computer users throughout the U.S.A. and the world every three months, to continue your exposure to the buying public. Total support. Any questions?

Success speaks for itself. Let's talk. For a submissions package, write to:

Submissions Department
Instant Software, Inc.
Rt. 101 and Elm Street
Peterborough, N.H. 03458

or call 1-603-924-7296

Instant Software™

PETERBOROUGH
NEW HAMPSHIRE 03458

✓2

An in-depth look at wrap-around mortgages.

How to Buy and Sell Houses

Dale A. Whitman
Professor of Law
University of Washington
18011 60th Avenue, N.E.
Seattle, WA 98155

Financing the sale of your house isn't as easy as it once was. Interest rates on new home mortgages have recently reached high levels which were previously undreamed of, and in too many cases money isn't available from lending institutions at any interest rate. Even if a loan can be obtained, many prospective buyers prefer not to lock themselves into high interest rates, and unless an alternative method of financing the sale is available, they may simply decide to wait.

If your house is on the market and you need to sell quickly, you can be devastated by such buyer reactions.

The alternative which many people have settled on in recent months is financing by the seller himself. If the seller is willing to defer receiving some or all of his equity, and if he will settle for a lower interest rate on the deferred amount than institutional lenders are demanding, he may be able to arrange a much quicker sale.

If there is an existing mortgage loan on the property, it usually has a considerably lower interest rate than current rates, and therefore it is desirable to keep it in effect when the house is transferred. But its outstanding principal balance at the time of the sale is often too low for the buyer to take it on with a cash down payment. For example, suppose the balance on the existing loan is $48,000 and the selling price of the house is $100,000. (The original balance when the existing loan was first made would have been somewhat higher than $48,000, and would have been reduced by the portion of each monthly payment that is applied to amortization. For example, if the original balance were $50,000, the interest rate eight percent and the stated term of the loan 30 years, and if four years and two months had elapsed at the time of the resale of the house, the outstanding balance on the original loan would be just slightly over $48,000.) These figures are a bit higher than average, but not at all unusual.

Unless the seller provides some financing, the buyer will need to come up with the $52,000 difference in cash (which many buyers would find financially impossible) or obtain a second mortgage loan from a bank or finance company (which might be extremely difficult and might involve even higher interest rates than prevail on first mortgages).

Here seller financing can come to the rescue. One method involves the seller "taking back" a second mortgage for part of the price. In the example above, the seller might accept the buyer's promissory note and mortgage for $25,000, leaving only $27,000 in cash to be paid by the buyer at the time of the transfer. In a typical case, the buyer might have ten to twenty years to pay off the second mortgage in monthly installments of principal and interest.

If this method is used, the buyer and seller agree on an interest rate which is to accrue on the unpaid balance of the second mortgage and note. For instance, if they agree on 12 percent interest and a 20-year term, the monthly payments on the second mortgage will be $275.27.

At the same time, the buyer assumes and begins to make the full monthly payments to the lending institution which holds the first mortgage loan originally placed on the property by the seller when he bought the house. If the interest rate on that loan is eight percent and it had an original term of 30 years and an original balance of $50,000, its monthly payments will be $366.88. Thus, the buyer makes two payments each month —one to the bank (or other first mortgage lender) and the other to the seller. Their total will be $642.15.

If this is the approach on which the parties agree, it is easy to calculate the yield (that is, the effective interest rate) to the seller; it is the same as the agreed interest rate on the second mortgage note.

There's another way for the parties to structure the transaction—a way that can give the seller a much higher effective yield on his investment, and yet which may still be very acceptable to the buyer. It's called the wrap-around mortgage. (Californians, who seem to like being different, usually call it the "all-inclusive deed of trust". The meaning is exactly the same as the wrap-around mortgage.)

Here's the way it works. Based on the facts of our example above, the seller agrees to provide all necessary financing, $73,000, himself. He agrees to make this financing available to the buyer for a 25-year term at 12 percent interest. As in the illustration above, the buyer needs to put down only $27,000 in cash.

Under this approach, the original loan to the bank will not be paid off at the time of the sale. Instead, each month the *seller* receives the monthly payment on the $73,000 "loan" from the buyer, and will make the monthly payment to the bank on the original loan. Technically, the $73,000 "loan" is secured by a second mortgage, since the first mortgage to the bank is still in existence.

But from the buyer's point of view, the bank is out of the picture; he is paying on only one loan, and the payments are made to the seller.

The significant advantage of this method from the seller's perspective is that it earns him a much higher effective yield than the stated 12 percent interest. This is because part of the money the seller is "loaning" is in turn being lent to him by the bank at (by current standards) an exceptionally low rate of interest. In our example, only $25,000 of the $73,000 "loan" made by the seller is really being made with the seller's capital. The rest is, in reality, the bank's money, lent in an earlier era at only eight percent. Yet the seller is receiving 12 percent interest on the whole $73,000.

GOSUB

PRINTERS
EPSON MX-80.....$555
BASE 2 850.....$749
OKIDATA.....$569
$25.00 S/H ON PRINTERS

NOVATION MODEMS
D-CAT.....$178
CAT MODEM.....$158

$ NEW FROM GOSUB $
EPSON MX-80/MX-70
FRICTION FEED KIT!
.....$49.95

DISK DRIVES
CCI-100 (LIST $425.00)
40 TRACK-102K BYTE ON SS/SOFT SECTOR/TRS-80 MODEL I.....$339.00

CCI-280 (LIST $575.00)
80 TRACK-102K BYTE ON SS/SOFT SECTOR/TRS-80 MODEL I.....$449.00
POWER SUPPLY-CASE-EXT. CARD EDGE-WARRANTY: 90 DAYS + 1 YEAR ON POWER SUPPLY.

SOFTWARE FOR TRS-80 MODEL I & III/PMC-80
MERCENARY FORCE....$16.95 **YAHTZEE I**....$10.95
QUARTER HORSE.....$8.95 **WARRIOR**.....$9.95
GAME PACK #1 QUARTER HORSE + YAHTZEE.....$14.95
GAME PACK #2 WARRIOR + SPACE MERCHANT...$14.95

KANSAS RES. ADD 3% SALES TAX.
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.
FREE CATALOG UPON REQUEST.
(TRS-80 IS A TRADEMARK OF TANDY CORP.)

SEND CHECK OR MONEY ORDER TO:

GOSUB ✓284

P.O. BOX 275-G
WICHITA, KS 67201

COMPILERS

ACCEL2: Compiler for TRS-80 Disk BASIC. Compiles selected subset to Z80 machine code in all four variable types, compact 1K run-time component controls interpreter to streamline all other statements and functions. Technique minimises code expansion without impairing huge speedups for true double optimisation. Six diagnostic messages, Local/Global options increase compatibility with subject programs. Output save to Disk, tapes. Professionals note: No royalties on the derived code. It's like having a 100 mhz clock **$88.95**

ACCEL: Compiler for TRS-80 Level II BASIC. Same huge speedups as ACCEL2 but in INTEGER variable type only. Run-time component just 256 bytes, ideal for graphics, games in 16K. Developed in Britain by Southern Software. **44.95**

TSAVE: Writes compiler output to SYSTEM tape **$9.95**

SOFTWARE CPU™

Super STEP: Animated Z80 Programming Models, Disassembler, Single-step/TRACE modes with intelligent RAM Window, 5 user-selectable Windows, single and cumulative instruction times in microseconds, Reference Space, much more. Big booklet, a Z80 Software CPU. 16K Level II TRS-80, TBUG required. No. BL-0 ..... **$19.95**

Super TLEGS: Relocates TBUG, Super STEP **$9.95**

EMU 02: Animated 6502 Programming Models, Disassembles to 6502 mnemonics. Single-step/TRACE modes, 6502 counterparts to #B, #J, #R, #F and #G commands, fast Cross-interpreter, keyboard scan port with p-instructions DB, EB control, paging in virtual address space, more. Big booklet & SYNERTEK card, a 6502 Software CPU.
16K Level II TRS-80, TBUG required. No. BL-1 ..... **$24.95**

COLOR COMPUTER

COCOBUG: 6809 Debugging monitor for TRS-80 Color Computer. Examine, modify memory/CPU registers, place breakpoints, execute single instructions or entire machine language programs in real time. Includes 6809 Reference card, runs in 4K. **$19.95**

MASTERCARD/VISA
Incl. .75 postage, CA add 6%

ALLEN GELDER SOFTWARE
Box 11721 Main Post Office
San Francisco, CA 94101

✓79

TRS-80, TBUG tm Radio Shack/Tandy Corp.
Software CPU tm Allen Gelder Software.

If the fact of the seller's yield being higher than 12 percent is not immediately obvious to you, imagine a situation in which you could borrow money from the bank at eight percent, relend it to another borrower at 12 percent, and use none of your own money at all. Here your effective yield (if we ignore your overhead costs) would be infinite! The seller who makes a wrap-around loan is not in quite this attractive a position, but he comes close if his own capital investment is small compared to the balance on the existing loan.

Enter the Computer

If a seller is considering making a wrap-around loan to finance his sale, he would like to know just what the effective yield will be. Program Listing 1 will answer that question quickly and precisely. It will also allow easy variation in the parameters of the transaction, so that the seller can ask "How much would my yield be affected if the wrap-around loan is for 20 years rather than 25?" and other similar questions. The program also lets the user determine the yield if the wrap-around loan is paid off prior to maturity.

Program Description

Here's an analysis of the program. Lines 100 through 150 input the original data on the existing loan. Line 120 converts the interest rate into a monthly decimal factor with the expression I1 = I0/1200. Similarly, line 130 converts the term of the loan into months by the expression N1 = N0*12. Line 150 computes a composite date by multiplying the year in which the loan was made by 12, and adding the month.

Lines 160 and 170 plug the relevant values into the subroutine at line 1000, which is a standard formula for computing the monthly payments on a fully amortizing loan. This monthly payment amount is then assigned the variable M1. Lines 200 to 260 implement a similar procedure by inputting relevant values for the wrap-around loan. Monthly payments are then computed in line 270 and the subroutine at line 1000.

Line 270 also computes R1, the number of months remaining on the original bank loan. Line 280, along with the subroutine at line 2000, then computes the future value of the original loan amount as of the time the wrap loan is made. Line 290 (together with the subroutine at line 3000) computes the future value of the payments which have been made on the original loan up to the time the wrap loan is made. The difference between these two values is, by definition, the outstanding balance on the original loan as of the date of the wrap loan closing. This is a standard method for calculating the outstanding balance on a mortgage loan as of a given date. That amount is assigned to variable B1 in program line 290.

The program section running from line 400 to line 465 displays all of the data which has been input on both of the loans, as well as the monthly payments on both. If you have made an error in inputting some data item, you can see the mistake on the screen. Hit BREAK, and GOTO 100. This will correct the mistaken item without disturbing the other data.

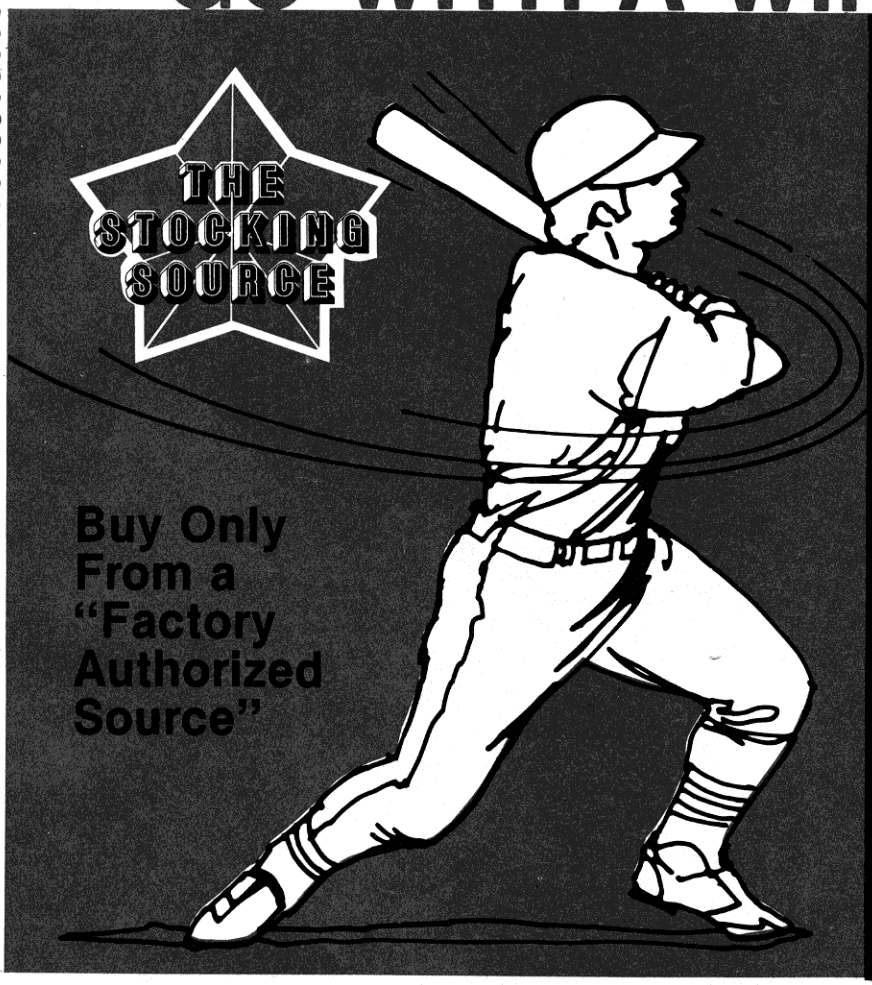
Line 470 displays the previously calculated balance on the original loan at the time the wrap loan is made. Lines 502 through 509 calculate and display the wrap lender's investment in the wrap loan—that is, the amount of the wrap loan minus the balance owing on the original loan. If there were no wrap loan, but instead a sale (by the seller) for cash, he would receive this amount after paying off the original loan. Hence, it represents his capital investment in the transaction.

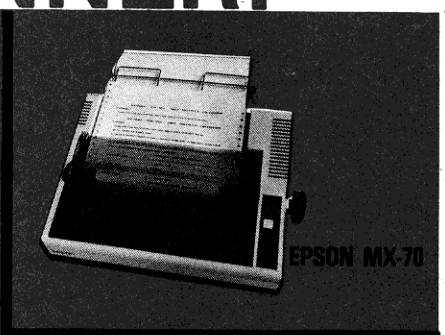
Incidentally, the program refers to the "wrap lender" here, but that person, in our illustration, is simply the seller of the property. Sometimes institutional investors, especially life insurance companies, make wrap-around loans on properties which are not being sold by the lender. The program uses "wrap lender" for the sake of generality.

The section starting with line 510 deals with the possibility that the wrap loan will be paid off prior to its maturity in a lump sum. Many house sellers put clauses in the documents requiring this; they may put the wrap loan on a schedule of payments which would require 20 years to pay off, but require a cash payoff after, say, three years. This will give the buyer time to refinance the house with an institutional lender, perhaps at a lower interest rate (if rates fall, which the parties hope, but which is by no means certain.) Even if prepayment is not obligatory, the buyer may desire to prepay the loan anyway because lower rates have in fact become available.

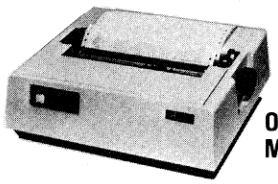
If the user indicates at lines 510 and 512 that a prepayment will occur, line 515 then computes the balance which the wrap loan will have on the payoff date, and lines 540 through 560 do the same with the balance on the original loan as of the wrap loan's assumed payoff date. Both of these

GO WITH A WINNER!





PRINTERS



Okidata Microline 82

	List Price	Your Cost
NEW — Okidata Microline 82	$ 799.	$799 Ask For Our Price

Features: 80 C.P.S.; Bidirectional; Full forms Control; Choice of Parallel or Serial Interface as Standard; Buffered Serial Optional

Epson Model MX-70	$ 449.	Ask For Our Price

Features: 80 C.P.S.; Unidirectional; Bit Plot Graphics; Adjustable Sprocket from 4" — 10"

	List Price	Your Cost
Epson Model MX-80	$ 645.	Ask For Our Price
Okidata Microline 80	$ 599.	$599 Ask For Our Price
Okidata Microline 83	$1260.	Ask For Our Price
Anadex DP-9500 & DP-9501	$1650.	Ask For Our Price
Anadex DP-9000	$1550.	Ask For Our Price

INTERFACES —

Epson Apple Plug-in Interface & Cable	$110.
Epson Serial Interface & Cable	$ 90.
Epson IEEE 488 Interface & Cable	$ 80.
Model TRS-80 Expansion Interface Cable	$ 35.
Model 232 Universal Serial Interface Cable	$ 25.

NEW — Epson Hi Res Bit Plot Graphics E-Proms	$60./set
Okidata Microline 80 Tractor	$ 50.
Okidata Microline 80 RS-232 Interface with 256 Character Buffer	$160.

NEW LINES CENTRONICS PRINTERS — The complete line Model 737 Letter Quality Printer with True Lower Decenders, Friction & Sprocket Feed, Bi-Dir. Paper Drive.

NEC PRINTERS — Spinwriters and Trimliners fully formed character printers, Thimble and Band.

master charge VISA

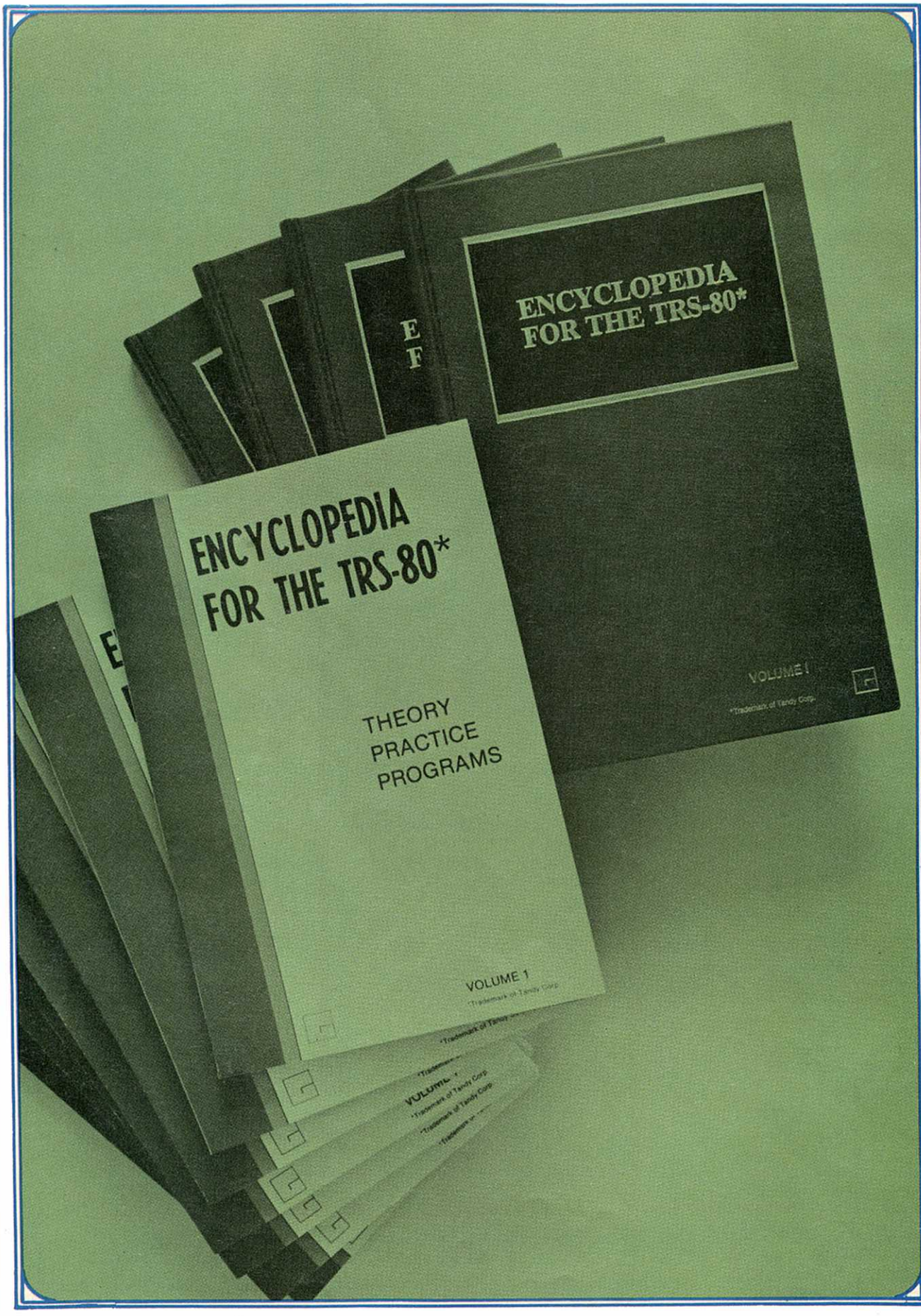
ASK FOR OUR INSTANT DISCOUNT
From Roy Hawthorne
Talk To Bill Tokar On Applications

CALL TOLL FREE
U.S.A.
1-800-521-2764
MICHIGAN
1-800-482-8393

Reminder:
We are open
8:30 AM to 5:00 PM EST
Monday through Friday

WRITE TO:
"The Stocking Source"
24069 Research Drive
Farmington Hills, MI 48024
313-474-6708 ✓438

✓See List of Advertisers on page 306


ENCYCLOPEDIA
FOR THE TRS-80*
VOLUME I
*Trademark of Tandy Corp.
ENCYCLOPEDIA
FOR THE TRS-80*
THEORY
PRACTICE
PROGRAMS
VOLUME 1

The Newest Peripheral for your Microcomputer

The Encyclopedia for the TRS-80*

What's the key to getting the most from your TRS-80? No, it isn't disk drives or printers or joysticks. It's **information**. Without a continual supply of information and ideas, you can't realize the full potential of the TRS-80.

Now, you'd think that the 150 pages of articles published in **80 Microcomputing** each month would satisfy even the most voracious of TRS-80 users. But no! You've asked for even more information!

Our response to the clamor for additional information is the **Encyclopedia for the TRS-80**, a ten-volume reference work that is absolutely packed with programs and articles carefully selected to help you make the most of your microcomputer. You can consider the volumes of the **Encyclopedia** to be an extension of the documentation that came with your TRS-80. The articles and programs will be similar to those found in **80 Microcomputing**. Each book is full of material on programming techniques, business, games, tutorials, education, utilities, interfacing. . . you name it.

Unlike conventional encyclopedias, the **Encyclopedia for the TRS-80** will never become stale or out of date. That's because the volumes of the **Encyclopedia** are being issued one-at-a-time, over a period of months. This means that each new volume will reflect the latest developments and discoveries, making this a **living** encyclopedia for TRS-80 users.

Volume 1 will be out in June. It's more than 270 pages in length. . . that's 270 pages of solid information. . . no advertising. Here's a sample of what's included in Volume 1:

Four Graphics Methods—Improved techniques for dealing with the TRS-80's low resolution graphics.

TTY Interface—Build an interface hookup a Teletype to a TRS-80

The President Decides—A thrilling simulation that lets you make decisions as if you were President of the United States

TRS-80: Calling FORTRAN from BASIC—Call Microsoft FORTRAN subroutines from BASIC on the TRS-80

Measure Instructional Effectiveness—Many programs teach or tutor; this one helps determine the effectiveness of the lessons.

The Invoice—A program for small businesses which produces custom invoices.

Punch Out Your Disks—Double your disk storage in seven easy steps

LOAD and Go—Adds a new and useful command to Level II BASIC.

The **Encyclopedia for the TRS-80** is available in two editions. The deluxe COLLECTOR'S EDITION is a handsome green and black hardcover volume, with the title stamped in gold and a colorful protective dust jacket provided. These durable volumes are perfect for school and library use and make a handsome addition to your personal library. They are available for $19.95 per volume. Also available is the more economical softcover edition. This contains all the information in the hardcover edition, but at a savings of over 45%. It is ruggedly bound for heavy use and has an attractive green, ivory, and gold cover. Available for $10.95 per volume. Both editions are in an easy-to-read 6" × 9" format which is perfect bound to remain flat when opened.

80 MICROCOMPUTING SPECIAL INTRODUCTORY OFFER

Order the entire set (the first ten volumes) of the **Encyclopedia for the TRS-80** and receive the tenth volume **FREE!**

PAY ONLY $164.00 for the first ten volumes of the deluxe hardcover COLLECTOR'S EDITION—a regular **$199.50** value

PAY ONLY $83.00 for the first ten volumes of the softcover edition—a regular **$109.50** value

PLUS—This special offer includes UPS shipping and handling charges (an additional savings of **$15.00**)

Beat inflation by buying the whole set now. . . we cannot guarantee these same single volume prices for future volumes. You cannot lose! Preview the first volume of the set and judge for yourself. If the **Encyclopedia for the TRS-80** does not meet your needs or expectations, just return the first volume within ten days and we will refund the entire amount of your purchase. If at any time you are dissatisfied, you may cancel the remaining volumes and receive a refund for the full value of those volumes. The books will be automatically shipped to you every 6 weeks via UPS. Take advantage of this offer now! You can't afford to miss out on the newest peripheral—the **Encyclopedia for the TRS-80**. Call your order in today TOLL FREE at 1-800-258-5473, or use the coupon below or the postage-paid postcard included in this magazine.

THE Encyclopedia for the TRS-80*

YES, please reserve for me a complete set of the first ten volumes of the **Encyclopedia for the TRS-80**.

___ I want to go first class so send me the deluxe hardbound COLLECTOR'S EDITION—a $199.50 value for **$164.00 postpaid**. A total savings of $34.95 over the single volume price! (Order #EN8100)

___ Send me the "blue collar" softcover edition—the same information at a substantially lower price, a $109.50 value for **$83.00 postpaid**! A total savings of $25.95 over the single volume price! (Order #EN8080)

YES, I want to start my Encyclopedia collection due out in June.

___ Volume 1 of the deluxe hardcover COLLECTOR'S EDITON @$19.95 (Order #EN8101)**

___ Volume 1 of the Softcover edition @ $10.95 (Order #EN8081)**

***(Please enclose $1.50 per volume for shipping and handling. All volumes will be shipped UPS if the complete street address is provided; otherwise shipment is by 4th class book rate.) Allow 8-10 weeks for delivery.*

___ ***Payment enclosed*** ***Please charge to my*** ___ ***VISA*** ___ ***Mastercard*** ___ ***AmEx***

Card# _____ ***MC Interbank#*** _____ ***Expires*** _____

Name _____

Address _____

City _____ ***State*** _____ ***Zip*** _____

Signature _____

80 Microcomputing, Pine St., Peterborough, NH 03458

*TRS-80 is a trademark of Tandy Corp.

8005

". . . every time you RUN the program while debugging it, your data will be in place automatically. . . ."

routines use the same procedure discussed above in connection with lines 280 and 290. Incidentally, the original loan *must* be paid off by the seller at the same time the wrap loan is paid off by the buyer (if it has not already been fully paid by the monthly payments); otherwise the buyer would have fully paid for the property, but would still not have cleared his title of the original mortgage.

Using this information on the balances due on the two loans at the time of payoff (TW and TE, respectively), lines 580 through 590 display the financial consequences of the payoff: how much money is received by the wrap lender, how much of that must be paid over to the original lender, and how much the wrap lender retains.

Computing the Yield

Now we come to the part of the program for which all the rest is merely prologue—the computation of the yield (i.e., the effective interest rate to the wrap lender) on the wrap loan. Two separate routines deal with this matter, depending on whether an early payoff is expected or not. Variable Y is the flag which indicates whether early payoff will occur. In line 620 it sends execution to line 650 thorugh 660 if there is no early payoff, while if there is, lines 625 through 645 control instead.

The yield computation itself is a recursive process, and works like this in principle: Some interest rates are simply assumed to be the correct yield. (In this program, the initial trial assumption is 18 percent per annum, or .015 per month, set in line 610.) Then the present value (as of the date the wrap loan is made) of all future cash flows to the wrap lender is computed, using the assumed interest rate as a discount factor. The actual formulas which do this discounting are in lines 4000 and 5000. The discounting present values are then summed against one another; some of them are positive (e.g., the monthly payments received by the wrap lender) and some are negative (e.g., the monthly payments made by the wrap lender to the original lender). Their sum is variable SM in line 640 or 660.

This present value is then netted against the wrap lender's original investment, previously derived as P2-B1. If the net present value is exactly equal to P2-B1, so that the sum is zero, we have happened to pick exactly the correct yield or discount rate—18 percent! Of course, it would be blind luck if this happened, and normally the sum (NV in line 670) is either positive or negative, and not zero. Lines 680 and 690 use this information (the sign of NV, represented by BASIC keyword SGN) to adjust the assumed discount rate and execution is sent back to line 625 or 650, the beginning of the FOR-NEXT loop which calculates the present values, for a new trial.

Lines 680 and 690 do what is termed a binary search. For example, if the assumed discount rate of 18 percent is too high, it will produce a net present value, SM in line 670, which is lower than the wrap lender's original investment (P2-B1). NV will then have a negative sign, and line 680 adjusts the assumed interest rate IT downward by one-half of the difference between IT's previous value and its value in the trial before that. Thus, in successive trials, IT might assume values of 18 percent, nine percent, 13.5 percent, etc. as it closes in on the correct value. When the correct value is finally reached, so that SGN of the difference between the last two interest rate trials is zero, control passes to line 700 for a print of the final value.

The approach of successive trials is the only feasible way of computing the effective yield produced by a series of unequal future cash flows, and it takes time. The loop used in this program has 99 steps, but in fact I have never had a computation require more than 25, and they are often shorter. About ten seconds or so are required for 25 steps.

Lines 695 and 696 display the trial number, the net value, and the assumed interest rate for each trial, so you can see the progress the computer is making, and so you will know that the program has not locked up or bombed.

One might worry about precision in this program, but such concerns are really irrelevant. The six digits of single-precision arithmetic are more than adequate for purposes of comparing yields on alternative investments with the wrap-around loan. I tried changing to double-precision, but succeeded only in slowing down execution very noticably without producing more useful results.

Programming Tips

I like to write programs which deal with financial and investment decisions, and I'd like to pass on a few ideas I've discovered which make writing and running such programs much easier and more enjoyable.

The first idea stems from the fact that any editing of a program line wipes out all stored variable values. In a program which is being debugged, and which requires a large number of variables to be defined (as by INPUT statements), this is a pain in the neck. You can easily spend half of your program writing time inputting the same old data again and again.

To solve this problem, use a DATA statement like that in line 10000, along with a READ statement like line 95. Thus, every time you RUN the program while debugging it, your data will be in place automatically and without delay or pain. The READ statement should be placed before the point in the program to which return is made after a full run of the program—line 100 in this case.

The DATA and READ statements have another advantage as well, and I always leave them in even after the program is fully debugged for this reason. They make demonstrations of the program very easy, since if spectators have no particular data they wish to see run, your pre-written DATA statement will show them very quickly how the program operates.

A second idea which is very helpful in programs of this kind grows out of Level II BASIC's characteristic of simply leaving the former value of a variable in place if an INPUT statement is encountered and the user merely presses ENTER without any numbers. This means that you can write INPUT statements which display the former value, then ask the user to input a new value. If the old value is satisfactory, the user can simply press ENTER without taking the trouble to insert the same value over again. This program uses this feature in lines 100 to 150 and 200 through 250. When combined with the READ and DATA statements mentioned above, they permit an extremely quick demonstration of the program; the user merely types RUN and then presses ENTER to show, in sequence, each item of data on each of the two loans. The pre-existing values are shown in brackets, and can readily be changed by typing new values if desired.

Using this technique requires a little care in writing the program, as it is important that further manipulations on a variable's value not be done once it is input. For example, in the wrap-around mortgage program (and many other financial programs) it is customary to input interest rates on an annual basis (e.g., 12 percent). But the rate must be converted to a monthly decimal for computation purposes. One often sees programs which redefine the original variable

". . . the use of the STRING$ command is an excellent way to divide up the screen. . . ."

to accomplish this. For example:

```
120 INPUT "ANNUAL INTEREST RATE";I1:I1 = I1/1200
```

There's nothing wrong with this method if the program will be run only once. But if you plan to repeat it, using most of the same input data again without a new RUN (as by the GOTO 100 in line 730), you discover that in the second run I1 is all wrong. Thus, if the value originally input for I1 in the first run was 12, line 120 above will convert it to .01. The next time line 120 is executed, if no new I1 is input, the program will divide the .01 value by 1200, giving you an I1 of .000083, which is obviously wrong.

Fortunately, this problem is easy to avoid. Simply use a new variable for the manipulation of the input data, rather than redefining the old variable. In line 120 of the wrap-around mortgage program, I0 is the value to be input; I1 is then defined as I0/1200, leaving I0 at its original value. It will still be there, with a value of 12, the next time line 120 is executed. The same principle may be seen in line 130, which manipulates the term of the loan, converting it from years to months.

This program is written in 32-character-per-line format because it was originally prepared for classroom demonstration purposes in my private land development course. I use 19-inch Sony TV monitors with direct video input; they are designed for use in a closed-circuit TV system, and with a suitable adapter (containing merely a single feedthrough capacitor), perform very nicely when driven by the TRS-80. However, their resolution is not as good as the TRS-80's 12-inch monitor, and the bigger print is therefore quite helpful, especially for students who may be 20 feet or more from the monitor. In general, the 32-character format is often preferable even for home use, especially when only a small amount of information needs to be shown on the screen at one time.

Finally, the use of the STRING$ command is an excellent way to divide up the screen into several blocks showing different sets of information. STRING$ is rapid in execution and easy to program; I think it is one of the unsung heros of Microsoft's Level II. You'll see it in lines 105, 205, 405, 415, etc., in this program.

Legal Issues

While a wrap-around mortgage is often an attractive way to sell a house, it can raise some tricky legal problems. There isn't space in this article to discuss them in any real depth, but let me mention two of the more important ones.

Many mortgage loans made by institutional lenders in the past few years contain "due-on-sale" clauses. Such a clause says, in substance, that if you sell your house without the bank's permission, it has the right to insist that the loan be paid off immediately. Often the bank will give the necessary permission, but only on condition that (1) the new owner has satisfactory

```
10 '*** WRAPAROUND MORTGAGE YIELD ***
20 '                    DALE A. WHITMAN
30 '18011 60TH AVE. N.E.
40 'SEATTLE, WA. 98155
45 DIMIT(99)
50 CLS:PRINTCHR$(23):PRINT"THIS PROGRAM COMPUTES THE":PRINT"EFFECT
     IVE YIELD ON A":PRINT"WRAP-AROUND MORTGAGE.
60 FORN=1TO1000:NEXTN
80 READP1,I0,N0,Y1,X1,P2,I9,N9,Y2,X2
90 DEFSTRF:F="###,###"
100 CLS:PRINTCHR$(23):PRINT"ENTER DATA ON EXISTING LOAN:"
105 PRINTSTRING$(31,61)
110 PRINT"ORIGINAL PRINCIPAL AMOUNT:":PRINT"  <";USINGF;P1;:PRINT"
     >";TAB(20)"";:INPUTP1
120 PRINT"ANNUAL INTEREST RATE:":PRINT"  <";I0;"% >";TAB(20)"";:IN
     PUTI0:I1=I0/1200
130 PRINT"ORIGINAL LOAN TERM (YEARS):":PRINT"  <";N0;" YRS >";TAB(
     20)"";:INPUTN0:N1=N0*12
140 PRINT"DATE LOAN ORIGINALLY MADE:":PRINT"  YEAR: <";Y1;">";TAB(
     20)"";:INPUTY1
150 PRINT"  MONTH: <";X1;">";TAB(20)"";:INPUTX1:D1=12*Y1+X1
160 P=P1:I=I1:N=N1:GOSUB1000
170 M1=M
200 CLS:PRINTCHR$(23):PRINT"ENTER DATA ON NEW WRAP LOAN:"
205 PRINTSTRING$(31,61)
210 PRINT"INITIAL PRINCIPAL AMOUNT:":PRINT"  <";USINGF;P2;:PRINT">
     ";TAB(20)"";:INPUTP2
220 PRINT"ANNUAL INTEREST RATE:":PRINT"  <";I9;"% >";TAB(20)"";:IN
     PUTI9:I2=I9/1200
230 PRINT"INITIAL LOAN TERM (YEARS):":PRINT"  <";N9;" YRS >";TAB(2
     0)"";:INPUTN9:N2=N9*12
240 PRINT"CLOSING DATE FOR WRAP LOAN:":PRINT"  YEAR: <";Y2;">";TAB
     (20)"";:INPUTY2
250 PRINT"  MONTH: <";X2;">";TAB(20)"";:INPUTX2
260 D2=12*Y2+X2
270 I=I2:N=N2:P=P2:GOSUB1000:M2=M:R1=N1-D2+D1
280 P=P1:I=I1:N=N1-R1:GOSUB2000:TA=T
290 P=M1:I=I1:N=N1-R1:GOSUB3000:TB=T:B1=TA-TB
400 CLS:PRINTCHR$(23);:PRINT"SUMMARY OF DATA INPUT:"
405 PRINTSTRING$(31,61)
410 PRINTTAB(10)"ORIG.LOAN";TAB(22)"WRAP LOAN"
415 PRINTSTRING$(31,61)
420 PRINT"ORIG.AMT.";TAB(12)USINGF;P1;:PRINTTAB(24)USINGF;P2
430 PRINT"INT. RATE";TAB(14)I0;"%";TAB(26)I9;"%"
440 PRINT"ORIG.TERM";TAB(16)N0;TAB(28)N9;
450 PRINT"MO. PMT";TAB(12)USINGF;M1;:PRINTTAB(24)USINGF;M2
460 PRINT"CLOSING";TAB(10)X1;"/";Y1;TAB(22)X2;"/";Y2
465 PRINTSTRING$(31,61)
470 PRINT"WHEN WRAP LOAN IS CLOSED, ORIG.":PRINT"LOAN BALANCE WILL
     BE $";:PRINTUSINGF;B1:PRINT"WITH";R1;"MONTHS REMAINING."
475 PRINTSTRING$(31,61)
480 INPUT"PRESS ENTER TO CONTINUE";Z2
485 CLS:PRINTCHR$(23):PRINT"HIT 1 TO RE-ENTER ORIGINAL LOAN":PRINT
     :PRINT"HIT 2 TO RE-ENTER WRAP LOAN":PRINT:PRINT"HIT ANY OTHER
     KEY TO CONTINUE."
490 X$=INKEY$:IFX$=""GOTO490
492 X=VAL(X$):ONXGOTO100,200
495 PRINT:PRINTSTRING$(31,61):PRINT
496 Y=0:PRINT"HIT 1 IF WRAP LOAN WILL BE":PRINT"PAID OFF PRIOR TO
```

Program continues

"You should discuss the wrap-around loan with the original lender before proceeding. . . ."

credit and income, and (2) the interest rate on the loan will be substantially increased.

From the viewpoint of the buyer and seller, the income and credit standards are usually no problem, but an increase in the interest rate may make the whole wrap-around mortgage idea far less atttractive, since it can drastically reduce the seller's yield on the wrap loan. Some states don't permit lenders to insist on an interest rate increase, but others do. What's more, federal savings and loan associations can demand interest rate increases in all states, since they are governed by federal law.

You should discuss the wrap-around loan with the original lender before proceeding with the transaction. If the lender objects or demands that the interest rate be increased, you will probably need to consult a reputable lawyer with real estate experience to determine whether the lender is on sound legal ground. By all means, stand up for your rights; lenders will often back down when confronted. But don't try to go ahead with the wrap-around transaction without telling the lender. The chances are very good that your buyer will be found out before long, and he may be forced to pay off the loan or switch to a higher interest rate under very inconvenient circumstances. In fact, if you are the seller under such conditions, you might end up having to pay a higher interest rate on the original loan than the buyer is paying you on the wrap loan!

A second caution—this time to buyers. You need to be sure that, when you pay your monthly installment to the seller, he in turn will pay the bank. It's a good idea to run your payments through a neutral third party, such as a lawyer or an escrow company, with instructions to split your payments into two parts, one to the seller and one to the bank. This way, the seller won't be tempted to keep all of your money and let the bank loan go into default.

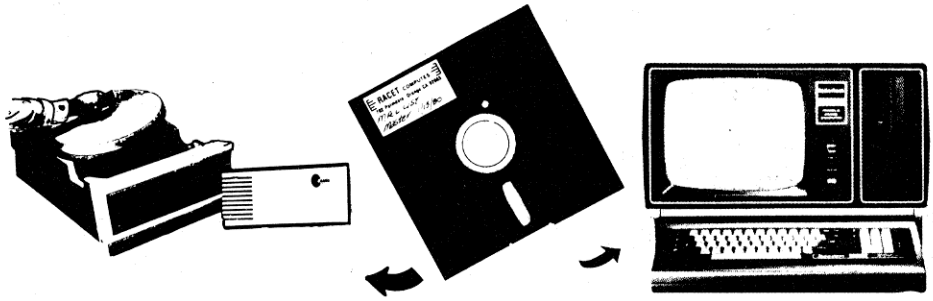
There are plenty of other legal considerations which go into the structuring of a wrap-around loan, so you should work with an experienced real estate lawyer. Real estate brokers and sales people often try to set up wrap-around deals without a lawyer's involvement, but too frequently they don't understand all of the ramifications of their own actions; indeed, the same is true of many lawyers who do not specialize in real estate work. Don't be afraid to spend a couple of hundred dollars on good advice and document preparation; it could save you thousands in higher interest or legal fees in the long run. ■

```
     MATURITY.":PRINT:PRINT"HIT ANY OTHER KEY TO CONTINUE."
497 X$=INKEY$:IFX$=""GOTO497
498 Y=VAL(X$):IFY=1THENGOTO499ELSEGOTO502
499 PRINT:INPUT"ENTER NUMBER OF YEARS TO PAYOFF";N8:N3=N8*12
502 CLS:PRINTCHR$(23);:PRINT"AT TIME OF WRAP LOAN CLOSING:":PRINT"
475 PRINTSTRING$(31,61)
480 INPUT"PRESS ENTER TO CONTINUE";Z2
485 CLS:PRINTCHR$(23):PRINT"HIT 1 TO RE-ENTER ORIGINAL LOAN":PRINT
     :PRINT"HIT 2 TO RE-ENTER WRAP LOAN":PRINT:PRINT"HIT ANY OTHER
      KEY TO CONTINUE."
490 X$=INKEY$:IFX$=""GOTO490
492 X=VAL(X$):ONXGOTO100,200
495 PRINT:PRINTSTRING$(31,61):PRINT
496 Y=0:PRINT"HIT 1 IF WRAP LOAN WILL BE":PRINT"PAID OFF PRIOR TO
     MATURITY.":PRINT:PRINT"HIT ANY OTHER KEY TO CONTINUE."
497 X$=INKEY$:IFX$=""GOTO497
498 Y=VAL(X$):IFY=1THENGOTO499ELSEGOTO502
499 PRINT:INPUT"ENTER NUMBER OF YEARS TO PAYOFF";N8:N3=N8*12
502 CLS:PRINTCHR$(23);:PRINT"AT TIME OF WRAP LOAN CLOSING:":PRINT"
     INVESTMENT OF WRAP LENDER (WRAP":PRINT"LOAN MINUS BALANCE ON
     ORIGINAL"
505 PRINT"LOAN = $";:PRINTUSINGF;P2-B1
508 PRINTSTRING$(31,61)
509 IFY=0PRINT:INPUT"PRESS ENTER TO CONTINUE";Z2:GOTO600
510 PRINT"AT TIME OF PAYOFF (";N8;"YEARS":PRINT"FROM WRAP LOAN CLO
     SING ):"
520 P=P2:N=N3:I=I2:GOSUB2000:TA=T
525 P=M2:N=N3:I=I2:GOSUB3000:TB=T
530 TW=TA-TB 'TW IS WRAP BAL AT PAYOFF
540 P=P1:N=N1-R1+N3:I=I1:GOSUB2000:TA=T
550 P=M1:N=N1-R1+N3:I=I1:GOSUB3000:TB=T
560 TE=TA-TB 'TE IS ORIG LOAN BAL AT PAYOFF
570 PRINT:PRINT"WRAP LOAN BALANCE:";TAB(20)USINGF;TW
580 IFTE<0PRINT:PRINT"ALL RETAINED BY WRAP LENDER.":PRINT:PRINT"OR
     IGINAL LOAN WILL BE FULLY PAID":PRINT:INPUT"PRESS ENTER TO CO
     NTINUE";Z2:GOTO600
585 PRINT:PRINT"ORIG.LOAN BALANCE:";TAB(20)USINGF;TE
590 PRINT:PRINT"NET CASH TO";TAB(20)"-------":PRINT"WRAP LENDER:";
     TAB(20)USINGF;TW-TE:PRINT:INPUT"PRESS ENTER TO CONTINUE";Z2:G
     OTO600
600 CLS:PRINTCHR$(23):PRINT"NOW COMPUTING YIELD."
610 IT(0)=0:IT(1)=.015
620 IFY=0GOTO650
625 FORJ=1TO99:I=IT(J):P=M2:N=N3:GOSUB4000:SM=T
628 IFTE>0P=TW-TEELSEP=TW
630 N=N3:I=IT(J):GOSUB5000:SM=SM+T
635 P=M1:N=N3:IFN1-D2+D1<N3THENN=N1-D2+D1
640 GOSUB4000:SM=SM-T
645 GOTO670
650 FORJ=1TO99:I=IT(J):P=M2:N=N2:GOSUB4000:SM=T
660 I=IT(J):P=M1:N=N1-D2+D1:GOSUB4000:SM=SM-T
670 NV=SM-P2+B1
680 IT(J+1)=IT(J)+SGN(NV)*(1/2)*ABS(IT(J)-IT(J-1))
690 IFSGN(IT(J)-IT(J-1))=0GOTO700
695 PRINT"TRIAL";J;" NET VAL DIFF.=";NV
696 PRINT"INTEREST =";1200*IT(J);"%":PRINT
697 NEXTJ
700 PRINT"FINAL YIELD =";1200*IT(J);"%"
710 PRINT:PRINT"PRESS ENTER FOR NEW RUN."
720 INPUTZ3
730 GOTO100
999 END
1000 V=1/(1+I)[N:M=P*I/(1-V):RETURN:'MONTHLY PAYMENT
2000 T=P*(1+I)[N:RETURN:'FUTURE VAL OF LUMP SUM
3000 T=P*(((1+I)[N)-1)/I:RETURN:'FUTURE VAL OF PERIODIC PMTS
4000 T=P*(1-(1/(1+I))[N)/I:RETURN 'PRES. VAL OF STREAM OF FUTURE P
     MTS
5000 T=P/(1+I)[N:RETURN 'PRESENT VAL OF SINGLE FUTURE PMT
10000 DATA40000,8,30,1975,1,80000,12,25,1980,1
```

Program Listing 1. Wrap-around Loan Program

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes

HARD DISK MULTIPLEXOR
FOR TRS-80* Mod II



NOW YOU CAN HAVE THAT LARGE COMMON DATA BASE!!

- Allows up to 4 Mod II's to connect to a single controller — up to 4 hard disk drives per controller. Users may access the same file simultaneously (first-come first-served).
- Uses Cameo controller and standard 10-megabyte cartridge (hard) disk drives along with RACET Hard/Soft Disk System (HSD) software. Removable Disk Pack Backup!
- Access times 3 to 8 times faster than floppy. Mixed floppy/hard disk operation supported.
- Compatible with your existing TRSDOS programs — you need only change filenames! All BASIC statements are identical.
- A single file may be as large as one disk. Directory expandable to handle thousands of files.
- Includes special utilities — XCOPY for backup and copies, XPURGE for multiple deletions, DCS directory catalog system, and Hard Disk Superzap. FORMAT utility includes options for specifying sectors/gran, platters/drive, logical disk size, etc.

HARD DISK DRIVE AND CONTROLLER $5995 **RACET HSD Software $400** Call for multiuser pricing. Dealers call for OEM pricing.

★★**NEW**★★ **DISCAT** (32K 1-drive Min) **Mod I, III $50.00**
This comprehensive Diskette Cataloguing/Indexing utility allows the user to keep track of thousands of programs in a categorized library. Machine language program works with all TRSDOS and NEWDOS versions. Files include program names and extensions, program length, diskette numbers, front and back, and diskette free space.

★★**NEW**★★ **KFS-80** (1-drive 32K Min — Mod II 64K) **Mod I, III $100.00; Mod II $175.00**
The keyed file system provides keyed and sequential access to multiple files. Provides the programmer with a powerful disk handling facility for development of data base applications. Binary tree index system provides rapid access to file records.

★★**NEW**★★ **MAILLIST** (1-drive 32K Min — Mod II 64K) **Mod I, III $75.00; Mod II $150.00**
This ISAM-based maillist minimizes disk access times. Four keys — no separate sorting. Supports 9-digit zip code and 3-digit state code. Up to 30 attributes. Mask and query selection. Record access times under 4 seconds!!

★★**NEW**★★ **LPSPOOL** (32K 1-drive Min) **Mod I $75.00**
LPSPOOL — Add multi-tasking to permit concurrent printing while running your application program. The spooler and despooler obtain print jobs from queues maintained by the system as print files are generated. LPSPOOL supports both parallel and serial printers.

BASIC LINK FACILITY 'BLINK' (Mod I Min 32K 1-disk) **Mod I $25.00; Mod II $50.00; Mod III $30.00**
Link from one BASIC program to another saving all variables! The new program can be smaller or larger than the original program in memory. The chained program may either replace the original program, or can be **merged** by statement number. The statement number where the chained program execution is to begin may be specified!

INFINITE BASIC (Mod I & Mod III Tape or Disk) **Mod I $50.00; Mod III $60.00**
Extends Level II BASIC with complete MATRIX functions and 50 more string functions. Includes RACET machine language sorts! Sort 1000 elements in 9 seconds!! Select only functions you want to optimize memory usage.

INFINITE BUSINESS (Requires Infinite BASIC) **Mod I & III $30.00**
Complete printer pagination controls — auto headers, footers, page numbers. Packed decimal arithmetic — 127 digit accuracy +, −, *, /. Binary search of sorted and unsorted arrays. Hash codes.

COMPROC (Mod I & Mod III — Disk only) **Mod I $20.00; Mod III $30.00**
Command Processor. Auto your disk to perform any sequence of instructions that you can give from the keyboard. DIR, FREE, pause, wait for user input, BASIC, No. of FILES and MEM SIZE, RUN program, respond to input statements, BREAK, return to DOS, etc. Includes lowercase driver software, debounce and screenprint!

GSF (Mod I & III Tape or Disk — Specify Memory Size) **Mod I $25.00; Mod II $50.00; Mod III $30.00**
Generalized Subroutine Facilities. The STANDARD against which all other sorts are compared! Machine language — fast and powerful! Multi-key multi-variable and multi-key character string. Zero and move arrays. Mod II includes USR PEEKS and POKES. Includes sample programs.

DSM (Mod I Min 32K 2-drive system. Mod II 64K 1-drive. Mod III Min 32K 1-drive) **Mod I $75.00; Mod II $150.00; Mod III $90.00**
Disk Sort/Merge for RANDOM files. All machine language stand-alone package for sorting speed. Establish sort specification in simple BASIC command File. Execute from DOS. Only operator action to sort is to change diskettes when requested! Handles multiple diskette files! Super fast sort times — improved disk I/O times make this the fastest Disk Sort/Merge available on the TRS.

UTILITY PACKAGE (Mod II 64K) **$150.00**
Important enhancements to the Mod II. The file recovery capabilities alone will pay for the package in even one application! Fully documented in 124 page manual! XHIT, XGAT, XCOPY and SUPERZAP are used to reconstruct or recover data from bad diskettes! XCOPY provides multi-file copies, 'wild-card' mask select, absolute sector mode and other features. SUPERZAP allows examine/change any sector on diskette including track-0, and absolute disk backup/copy with I/O recovery. DCS builds consolidated directories from multiple diskettes into a single display or listing sorted by disk name or file name plus more. Change Disk ID with DISKID. XCREATE preallocates files and sets 'LOF' to end to speed disk accesses. DEBUGII adds single step, trace, subroutine calling, program looping, dynamic disassembly and more!!

BASIC CROSS REFERENCE UTILITY (Mod II 64K) **$50.00**
SEEK and FIND functions for Variables, Line Numbers, Strings, Keywords. 'All' options available for line numbers and variables. Load from BASIC — Call with 'CTRL'R. Output to screen or printer!

DEVELOPMENT PACKAGE (Mod II 64K) **$125.00**
Includes RACET machine language SUPERZAP, Apparat Disassembler, and Model II interface to the Microsoft 'Editor Assembler Plus' software package including uploading services and patches for Disk I/O. Purchase price includes complete copy of Editor Assembler + and documentation for Mod I. Assemble directly into memory, MACRO facility, save all or portions of source to disk, dynamic debug facility (ZBUG), extended editor commands.

CIRCLE READER REQUEST FOR FREE 24-PAGE CATALOG
*TRS-80 IS A TRADEMARK OF TANDY CORPORTION

CHECK, VISA, M/C, C.O.D., PURCHASE ORDER
TELEPHONE ORDERS ACCEPTED (714) 637-5016

RACET COMPUTES
1330 N. GLASSEL, SUITE 'M', ORANGE, CA 92665

✓41

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS **RACET SORTS — RACET UTILITIES —**

✓See List of Advertisers on page 306

"I'm Wayne Green and I can save you $986 on the purchase of a computer system!

I hope that has your attention."

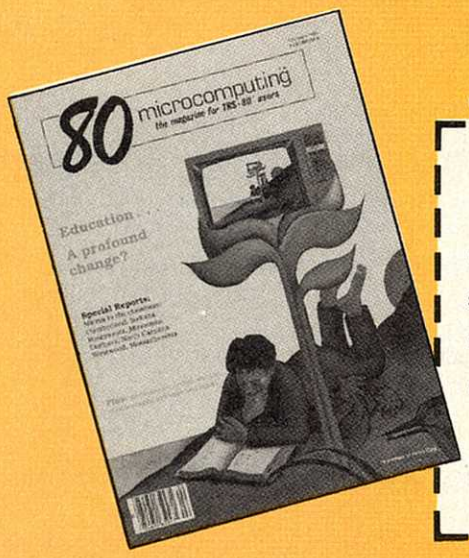
"That's the difference between walking into your local Radio Shack store and plunking down hard cash . . . and buying from the ads in **80 Microcomputing** magazine. That's the difference for a simple combination such as a Model III two disk system with 48K of memory, a modem and a Line Printer II: The Radio Shack price for that combination is $3,612. If you buy from the ads in my magazine, you'll buy exactly the same system for $2,626. So why throw away $986?

"The fact is that the money you can save on even the smallest accessory purchase will pay for the magazine subscription many times over. That's one of the reasons so many people are subscribing to **80.**

"Another is that it is the major source of information on the TRS-80 computer. In 1980 there were 335 feature articles on the system . . . with detailed instruction on how to do things (sorry about that), evaluations of accessories and software . . . and so on. I guarantee you'll find the magazine invaluable.

"A subscription to **80** is still only $18 (when are we going to raise that darned price to $25, where it should be?), so get your subscription in before I boost that price. It could be any day now."

Wayne Green
Editor/Publisher



If the coupon below has been used, please fill out subscription form on the Reader Service card in the back of the magazine.

YES! Sign me on as a subscriber to 80 Microcomputing for only $18 a year!

Card # _____ Exp. _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

- ☐ 12 issues – $18
- ☐ 36 issues – $45
- ☐ Please bill me
- ☐ Payment Enclosed
- ☐ Master Charge
- ☐ VISA
- ☐ American Express

80 microcomputing™
Peterborough, N.H. 03458

Subscription begins with next published issue.
Back issues, while available are $3 each.
Canada: $20 per year US funds.
All other foreign subscriptions: $28 one year only.

315B8

Evaluate the financing plan for your next new-used or used-new car with this program.

A Dollar Down . . .

Jack Martin
773 Radar Squadron
Montauk, NY 11954

When spring rolls around, you'll be looking at the rust spots, faded paint and scratches on the old family car, and getting the itch to trade her in for a shiny new one.

You'll visit the car lot, kick a few tires, and when you have that new car with all the options picked out, the sales representative will say, 'We'll take your old car and $5000. You can drive it home today for $175.78 per month, for the next 36 months. Can I write up the order?"

You'll study the figures, look at the bright paint job, look again at the figures, then you'll say, "Yeh, we'll take it!"

What you should do is take the figures home first, and run them through this program. It will provide answers to cost and interest quickly and without the sales-pitch pressure.

The Program

Although written for the Radio Shack Level II TRS-80, the program should readily adapt to other BASICs. There are no unique statements used, except INKEY$ to reduce response time and save wear on the ENTER key.

Lines 60 through 130 graphically introduce the program. Lines 150 to 190 ask the user to input information concerning the cost of the car, monthly payments, and the term of the loan. The program will handle periods of 18, 24, 30, 36, 42, 48, 54, or 60 months. These are common financing terms and should fit most circumstances.

Lines 350 through 400 and the data statements store specific values in the S(N,R) array. The value stored represents the Present Value of $1 Received Monthly or PVIF. It is based on the formula:

$$A_{n,r} = \$1\left[\frac{1-(1-r)^{-n}}{r}\right] = \$1\,P_{n,r}$$

The value is used to determine the interest rate and becomes a necessary ingredient in other calculations performed by the program.

After the math functions are completed, the program displays information concerning the car purchase (lines 520 to 630). Then the user may alter the interest rate or the period of repayment to see what difference the change makes. The new values are compared to the original deal. Sometimes these comparisons can be real eye-openers! If a comparison is not requested, the user may run a complete new cost analysis, or exit the program.

The percentage rate change and comparison is accomplished in lines 840 to 1340. The program will handle percentage inputs between nine and 24 percent. The time period is done in lines 1360 through 1830.

Buying the Car

Getting back to our car buying example, you would actually pay 16 percent interest on the loan, and the $5000 car would cost you $6328.08.

Could you get the loan cheaper, for less interest? Probably, but it would require shopping around for the loan just as carefully as you did for the car.

Let's say the local bank or credit union provided the $5000 loan at 12 percent interest over the same 36-month payment period. Using the comparison feature of the program, you discover you would only have to pay back $5978.48, a savings of $349.60. Look closer at the two comparisons. At 16 percent, your payments were $175.78, while at 12 percent interest they are $166.06. That leaves you $9.71 each month to spend.

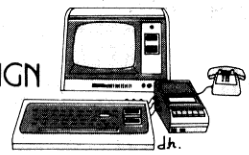
Cars cost quite a bit these days, but don't pay more than you have to. I hope this program will help prevent that.■

```
10 REM    *** CAR DEAL ***
20 REM    JACK MARTIN     MAY 1980
30 CLEAR500
40 A$="$$##,####.##"
50 DIM S(8,16)
60 CLS
70 PRINT:PRINT:PRINT:PRINT:PRINT
80 PRINTSTRING$(55,"$");
90 PRINT
100 PRINT@450,"              C A R    D E A L"
110 PRINT
120 PRINTSTRING$(55,"$");
130 FORX=1TO600:NEXTX
140 REM   INPUT DATA
150 CLS:INPUT"PRICE OF CAR --- $ ";C
160 PRINT
170 INPUT"AMOUNT OF MONTHLY PAYMENT --- $ ";M1
180 PRINT
190 INPUT"HOW MANY MONTHS TO PAY LOAN --- ";N1
200 IFN1=18THENB=1:GOTO320
210 IFN1=24THENB=2:GOTO320
```

INTERFACE EXPANSION BOARD

*For the TRS 80**

MD MICRO-DESIGN



The Interface Expansion Board gives your computer these features:

Phone Modem
2K E-PROM OPTION
32 K Memory
Real-Time Clock
Parallel Port
RS-232 Port
Dual Cassette Line
*Floppy Disk Controller**
On Board Supply
Silk Screen
Solder Mask
Expansion Port
Manual

In Stock Now
PC Board & user manual
MDX-1
64.95

MDX-2*
74.95

Add 5.00 for shipping & handling. Texas residents add 5% sales tax.

MANUALS $7.95

FREE PAMPHLET AVAILABLE
Call or write

MICRO-DESIGN ✓379
P.O. Box 18054
Austin, Texas 78760
1-512-458-2937

**TRS 80 is a Trademark of Tandy Corp.*

OSI (8K) APPLE TRS-80†

Computers & Gambling Products Magazine*

PRESENTS:

PROBABILITY HANDICAPPING DEVICE 1 — A BASIC PROGRAM FOR: HORSE RACE HANDCAPPING!

This incredible program was written by a professional software consultant to TRW Space Systems. This is a complex program carefully human factored for easy use. It is a comprehensive horse racing system for spotting overlays in thoroughbred sprint races. Your computer will accurately predict the win probability and odds line for each horse based on your entries from the racing form. The next day overlaid horses can be spotted on the track tote board. The user's manual contains a complete explanation of overlay betting plus much more useful information. The appendix contains a detailed tab run of a 100 consecutive race system workout showing **an amazing 50% return** ($1.50 returned for each $1.00 flat wager.) Includes many features such as error correction, bubble sort, line printer output, automatic keyboard debounce, archiving, etc. The manual may be ordered separately for perusal for $7.95 and credit.

CHALLENGER 1P, 2P, or 4P 8K VERSIONS Now Available!
Phd-1 User's manual and cassette for:
Apple II (16K), TRS-80 Level II (16K), Challenger (8K) ... 29.95
TRS-80 or APPLE DISK ... 34.95

BRAND NEW FROM SDL: WIN AT THE RACES. This thoroughbred handicapping algorithm is based on a currently popular book on thoroughbred multiple regression techniques. Both sprints and routes. All of the features of PHD-1 plus more. This program incorporates the best data entry technique we've ever seen.
32K TRS-80 or APPLE CASSETTE ... 34.95
32K TRS-80 or APPLE DISK ... 39.95

BOOKS:
Winning at the Races ... 21.95 + .75 P&H
Beating the Races with a Computer ... 14.95 + .75 P&H

Make checks payable to **JOE COMPUTER DEPT. 8** ✓193
22713 Ventura Blvd., Suite F, Woodland Hills, CA 91364
CA residents add 6 % sales tax.
PHONE ORDERS: 213-992-0514

*SEND $2.00 TO PLACE YOUR NAME ON OUR MAILING LIST.
†TRS-80 is a registered trademark of Tandy Corporation.


```
220 IFN1=30THENB=3:GOTO320
230 IFN1=36THENB=4:GOTO320
240 IFN1=42THENB=5:GOTO320
250 IFN1=48THENB=6:GOTO320
260 IFN1=54THENB=7:GOTO320
270 IFN1=60THENB=8:GOTO320
280 IFN1<>18ORN1<>24ORN1<>30ORN1<>36ORN1<>42ORN1<>48ORN1<>54ORN1<>
     60GOTO290
290 PRINT"SORRY - I CAN ONLY HANDLE FINANCING FOR 18, 24, 30, 36,"
300 PRINT"42, 48, 54 OR 60 MONTHS."
310 GOTO190
320 PRINT@916,"COMPUTING...."
330 LETX1=C/M1
340 REM   SET UP ARRAY
350 RESTORE
360 FOR N=1TO8
370 FORR=1TO16
380 READS(N,R)
390 NEXTR
400 NEXT N
410 REM   FIND 'X' VALUE
420 FORR=16TO0STEP-1
430 IFR=0THENPRINT:PRINT"I DO NOT FINANCE BELOW 9%":GOTO710
440 IFX1=S(B,R)THEN490
450 IFX1>S(B,R)THEN480
460 IFR=16ANDX1<S(B,R)THENPRINT:PRINT"THAT LOAN IS ABOVE 24%, MY L
     IMIT":GOTO710
470 LETP1=R+9:GOTO510
480 NEXTR
490 LETP1=R+8
500 REM   DISPLAY DATA
510 T1=M1*N1:I1=T1-C
520 CLS:PRINT"   C O S T   A N A L Y S I S"
530 PRINTSTRING$(55,"=");
540 PRINT:PRINT"COST OF CAR:";"";:PRINTTAB(45)USINGA$;C
550 PRINT"MONTHLY PAYMENT:";"";:PRINTTAB(45)USINGA$;M1
560 PRINT"PERIOD OF LOAN (MONTHS):";"";:PRINTTAB(48);N1
570 PRINT"INTEREST RATE OF LOAN (%):";"";:PRINTTAB(48);P1
580 PRINT"TOTAL COST OF LOAN:";"";:PRINTTAB(45)USINGA$;T1
590 PRINT
600 PRINT"AS YOU CAN SEE, IT IS A";P1;"PERCENT LOAN."
610 PRINT"THAT $";C;"CAR WILL ACTUALLY COST YOU $";T1
620 PRINT"OVER THE";N1;"MONTH PERIOD. YOU WILL PAY"
630 PRINT"$";I1;"IN INTEREST."
640 PRINT
650 PRINT"A DIFFERENT INTEREST RATE OR PERIOD OF LOAN CAN"
660 PRINT"MAKE A BIG DIFFERENCE. WANT A COMPARISON (Y/N)?"
670 GOSUB1970
680 IFKB=89GOTO770
690 IFKB<>78GOTO670
700 IFKB=78GOTO710
710 PRINT:PRINT"WANT ANOTHER COMPLETE COST RUN?"
720 GOSUB1970
730 IFKB=89GOTO30
740 IFKB<>78GOTO720
750 IFKB=78GOTO1850
760 REM   GET PARAMETER CHANGE
770 PRINT:PRINT"DO YOU WISH TO CHANGE <P>ERCENT OR"
780 PRINT"<M>ONTHS OF REPAYMENT?"
790 GOSUB1970
800 IFKB=80GOTO840
810 IFKB<>77GOTO790
820 IFKB=77GOTO1360
830 REM   PERCENT CHANGE ROUTINE
840 CLS:INPUT"WHAT IS NEW PERCENTAGE RATE (BETWEEN 9% & 24%)";P2
850 IFP2<9ORP2>24THENPRINT"THAT RATE IS OUT OF RANGE. ENTER AGAIN"
     :INPUTP2:IFP2<9ORP2>24THENGOTO850
860 PRINT@916,"STANDBY...."
870 IFP2=9THEND=1
880 IFP2=10THEND=2
890 IFP2=11THEND=3
900 IFP2=12THEND=4
910 IFP2=13THEND=5
920 IFP2=14THEND=6
930 IFP2=15THEND=7
940 IFP2=16THEND=8
950 IFP2=17THEND=9
960 IFP2=18THEND=10
970 IFP2=19THEND=11
980 IFP2=20THEND=12
990 IF P=21 THEN D=13
1000 IFP2=22THEND=14
1010 IFP2=23THEND=15
1020 IFP2=24THEND=16
1030 LETX2=S(B,D)
1040 LETM2=C/X2:T2=M2*N1:I2=T2-C
1050 CLS:PRINT"NOW THAT $";C;"CAR WILL COST YOU"
1060 PRINT"$";T2;"OVER THE";N1;"MONTH PERIOD."
1070 IFT2>T1GOTO1220
1080 PRINT"THAT MAKES THE";P2;"PERCENT LOAN "
1090 PRINT@188,USINGA$;T1-T2;:PRINT" CHEAPER THAN THE";P1;"PERCENT
      LOAN."
1100 FORZ=1TO500:NEXTZ
1110 PRINTSTRING$(55,"=");
1120 PRINT
1130 PRINT"LOOKING CLOSELY, YOU WILL NOTE THAT THE MONTHLY"
1140 PRINT"PAYMENTS ON THE";P2;"PERCENT LOAN ARE $";INT(100*(M1-M2
     ))/100
```

```
1150 PRINT"CHEAPER THAN THE";P1;"PERCENT LOAN. ALSO, IF"
1160 PRINT"YOU TRADED AT THE END OF THE YEAR, YOU WOULD"
1170 PRINT"STILL OWE $";T1-(M1*12);"WITH THE";P1;"PERCENT"
1180 PRINT"LOAN. AT";P2;"PERCENT, YOU WOULD ONLY OWE"
1190 PRINT"$";T2-(M2*12);". THIS GIVES YOU MORE TRADE-IN."
1200 PRINT:PRINT"HIT 'ENTER' TO CONTINUE":INPUTB$
1210 IFB$=""GOTO710
1220 PRINT"THAT MAKES THE";P1;"PERCENT LOAN"
1230 PRINT@188,USINGA$;T2-T1;:PRINT" CHEAPER THAN THE"
1240 PRINTP2;"PERCENT LOAN."
1250 PRINTSTRING$(55,"=");
1260 PRINT:PRINT"YOU CAN SEE THAT THE MONTHLY PAYMENTS"
1270 PRINT"ON THE";P1;"PERCENT LOAN ARE $";INT(100*(M2-M1))/100
1280 PRINT"CHEAPER THAN THE"P2;"PERCENT LOAN. ALSO,"
1290 PRINT"IF YOU TRADED AT THE END OF THE FIRST YEAR,"
1300 PRINT"YOU WOULD STILL OWE $";T2-(M2*12);"WITH"
1310 PRINT"THE";P2;"PERCENT LOAN. AT";P1;"PERCENT, YOU"
1320 PRINT"WOULD ONLY OWE $";T1-(M1*12)
1330 PRINT:PRINT"HIT 'ENTER' TO CONTINUE":INPUTB$
1340 IFB$=""GOTO710
1350 REM   MONTH CHANGE ROUTINE
1360 CLS
1370 INPUT"HOW MANY MONTHS IS THE LOAN FOR";N2
1380 IFN2=18THENE=1:GOTO1500
1390 IFN2=24THENE=2:GOTO1500
1400 IFN2=30THENE=3:GOTO1500
1410 IFN2=36THENE=4:GOTO1500
1420 IFN2=42THENE=5:GOTO1500
1430 IFN2=48THENE=6:GOTO1500
1440 IFN2=54THENE=7:GOTO1500
1450 IFN2=60THENE=8:GOTO1500
1460 IFN2<>18ORN2<>24ORN2<>30ORN2<>36ORN2<>42ORN2<>48ORN2<>54ORN2<
     >60GOTO1470
1470 PRINT"SORRY - I CAN ONLY HANDLE FINANCING FOR 18, 24, 30, 36,
     "
1480 PRINT"42, 48, 54 OR 60 MONTHS."
1490 GOTO1370
1500 PRINT@916,"COMPUTING...."
1510 LETR=P1-8
1520 LETX2=S(E,R)
1530 LETM2=C/X2:T2=M2*N2:I2=T2-C
1540 CLS:PRINT"NOW THAT $";C;"CAR WILL COST YOU"
1550 PRINT"$";T2;"OVER A";N2;"MONTH PERIOD."
1560 IFT2>T1GOTO1710
1570 PRINT"THAT MAKES THE";N1;"MONTH LOAN"
1580 PRINT@188,USINGA$;T1-T2;:PRINT" MORE EXPENSIVE THAN THE"
1590 PRINTN2;"MONTH LOAN."
1600 FORZ=1TO500:NEXTZ
1610 PRINTSTRING$(55,"=");
1620 PRINT:PRINT"UPON EXAMINATION, YOU CAN SEE THAT THE MONTHLY"
1630 PRINT"PAYMENTS ON THE";N2;"MONTH LOAN ARE $";INT(100*(M2-M1))
     /100
1640 PRINT"MORE THAN THE";N1;"MONTH LOAN. IF YOU TRADED"
1650 PRINT"AT THE END OF THE YEAR, YOU WOULD STILL OWE"
1660 PRINT"$";T2-(M2*12);"ON THE";N2;"MONTH LOAN, BUT"
1670 PRINT"IF YOU HAD THE";N1;"MONTH LOAN, YOU WOULD OWE"
1680 PRINT"$";T1-(M1*12)
1690 PRINT:PRINT"HIT 'ENTER' TO CONTINUE":INPUTB$
1700 IFB$=""GOTO710
1710 PRINT"THAT MAKES THE";N1;"MONTH LOAN "
1720 PRINT@188,USINGA$;T2-T1;:PRINT" CHEAPER THAN THE"
1730 PRINTN2;"MONTH LOAN."
1740 FORZ=1TO500:NEXTZ
1750 PRINTSTRING$(55,"=");
1760 PRINT:PRINT"NOTICE THAT THE MONTHLY PAYMENTS ON THE";N1
1770 PRINT"MONTH LOAN ARE $";INT(100*(M1-M2))/100;"MORE THAN THE";
     N2
1780 PRINT"MONTH LOAN. IF YOU TRADED AT THE END OF THE YEAR,"
1790 PRINT"YOU WOULD STILL OWE $";T2-(M2*12);"ON THE";N2
1800 PRINT"MONTH LOAN, BUT IF YOU HAD THE";N1;"MONTH LOAN,"
1810 PRINT"YOU WOULD OWE $";T1-(M1*12)
1820 PRINT:PRINT"HIT 'ENTER' TO CONTINUE":INPUTB$
1830 IFB$=""GOTO710
1840 REM   EXIT PROGRAM
1850 CLS:PRINT:PRINT:PRINT:PRINT"          AREN'T YOU GLAD YOU ASKED
      FOR MY HELP?"
1860 PRINT:PRINT:PRINT:PRINT"              $ $  CAVEAT  EMPTOR  $ $"
1870 PRINT:PRINT:PRINT:PRINT"                G O O D   L U C K !"
1880 END
1890 DATA16.779,16.651,16.524,16.398,16.274,16.151,16.030,15.909,1
     5.790,15.673,15.556,15.441,15.327,15.214,15.102,14.992
1900 DATA21.889,21.671,21.456,21.243,21.034,20.828,20.624,20.424,2
     0.226,20.030,19.838,19.648,19.461,19.276,19.094,18.914
1910 DATA26.775,26.447,26.125,25.808,25.496,25.190,24.889,24.593,2
     4.302,24.016,23.735,23.458,23.186,22.918,22.655,22.396
1920 DATA31.447,30.991,30.545,30.108,29.679,29.259,28.847,28.444,2
     8.048,27.661,27.281,26.908,26.543,26.185,25.833,25.489
1930 DATA35.914,35.315,34.730,34.158,33.600,33.054,32.521,32.000,3
     1.492,30.994,30.508,30.032,29.568,29.113,28.669,28.235
1940 DATA40.185,39.428,38.691,37.974,37.275,36.595,35.931,35.285,3
     4.656,34.043,33.445,32.862,32.294,31.940,31.120,30.673
1950 DATA44.179,43.246,42.342,41.465,40.612,39.786,38.983,38.203,3
     7.446,36.712,35.997,35.303,34.629,34.073,33.297,32.717
1960 DATA48.173,47.065,45.993,44.955,43.950,42.977,42.035,41.122,4
     0.237,39.380,38.550,37.745,36.964,36.207,35.473,34.761
1970 KB$=INKEY$:IFKB$=""GOTO1970
1980 KB=ASC(KB$):RETURN

DONE
```


EDU-WARE EAST
P.O. Box 336
Maynard, MA. 01754
617-568-8641
✓477

MATH-PAK-1: MATH-PAK-2: MATH-PAK-3

Interactive drill programs where you enter the answers digit by digit, just like paper and pencil. With user selected difficulty levels, carryovers, reducing, simplification, pointing off, scoring, games, and more. Used by schools everywhere. Order MATH-PAK-1 for integers, MATH-PAK-2 for fractions, MATH-PAK-3 for decimals. (L2-16K) $14.95 ea.

H-O-R-K-S

Low cost, single entry accounting system for the home or office. With 66 user assigned account codes, auto audit trail, search with totals, 32 or 48K, 1 to 4 drives, credit and debit summaries with 3 options, up to 9200 entries. $24.95/cassette $29.95/disc

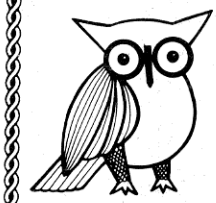
INVENTORY +

Why settle for just an inventory listing? Get aging reports with 2 options, reorder, total listings with purchase dates and amounts, total costs, items sold, profit/loss and more. Use as a stand alone system with daily updates, delete, change, and file packing routines. (32K - 1 disc minimum) $24.95/cassette $29.95/disc.

CASH REGISTER 80

Use your TRS-80 as a point of sale terminal with automatic inventory lookup, pricing, update, and more. Print sales slips with user adjusted formats, end of day reports with all cash, charge, and check sales by salesperson. CR80 requires INVENTORY+, 48K, and 1 disc minimum (2 drives recommended). $24.95/cassette $29.95/disc.

Mass residents and 5% tax. VISA, M.C., AND PHONE ORDERS ACCEPTED. Dealer inquiries invited. Overseas orders add $2.00 for air shipment. TRS-80 is a trademark of Tandy Corp.



THE WORD WIZARD

A LEVEL II WORD PROCESSOR

- Text NOT limited by memory
- 35 commands for easy processing
- Custom keyboard input routines
- Custom cassette I/O routines
- Custom hardcopy print routines
- Embedded Z80 routines for speed
- Includes hyphenation routines
- Long line input (255 characters)
- Huge text buffer (store 60 lines)
- Built in default values
- Global & Local search & replace
- Line move and Line duplicate
- Double sized headings supported

AND MUCH, MUCH MORE!
JUST $29.95

✓138

THE ALTERNATE SOURCE

1806 Ada Street
Lansing, MI 48910
517/487-3358
517/485-0344

Add $2.00 for crush-proof box, $1.50 for COD, Master Charge or Visa orders.

✓See List of Advertisers on page 306

AMERICAN

118 SO. MILL STREET ● PRYOR, OK 74361
PHONE (918) 825-4844

ALL LISTED PRICES ARE CASH DISCOUNTED. WE ACCEPT MC, VISA, AND COD (REQUIRES CERTIFIED CHECK, CASHIERS CHECK OR CASH). FOR CHARGE ORDERS PLEASE ADD 3%. FOR COD SERVICE PLEASE ADD 5%. SHIPPING AND HANDLING ARE FREE ON ALL ORDERS. OKLAHOMA RESIDENTS PLEASE ADD 4% SALES TAX.

32K-EXPANSION INTERFACES

SPECIAL OFFERING.
Due to a very special purchase, American Business Computers is able to offer a limited number of Radio Shack* Expansion Interfaces at the lowest price ever.

For TRS-80* Model 1

399.95

American Business Computers guarantees Expansion Interfaces to be Brand New—still in original documentation and in perfect working condition.

ALL CABLES AND DOCUMENTATION ARE INCLUDED WITH INTERFACES. ✓396

NEW PRODUCT FOR THE COLOR COMPUTER...MOON LANDER BY GREG ZUMWALT

In this exciting new adventure for the Color Computer* you attempt to guide your lander to a safe landing. Watch out for the hills and valleys and don't run out of fuel! Tough, Challenging, and Exciting. You won't want to miss this one.....ONLY **$14.95**

✓397

PAPER FOR YOUR PRINTER

9½ x 11
3200 Sheets - 15 Pounds
$39.00

Prices Includes Shipping Within Continental United States Via Ups

14 x 11
3200 Sheets - 15 Pounds
$44.00

★ ★ New Item ★ ★

Continuous Envelopes - That's Right - Fanfold envelopes with tractor perforations down either side.

ENVELOPE SIZE 4½ x 10" with tractor perforations 4½ x 11"

PRICE **59.95** per thousand. ✓483

MAGIC WAND AND THE MOD II

The Magic Wand is the most powerful, most flexible, most reliable, most usable word processing software available for a CP/M-Based Model II Computer [

$295

* TM Digital Research Inc.

That's not bragging. That's just telling it like it is.
The MAGIC WAND is the best word processing software ever written for a microcomputer. It can do more work in less time with higher quality than any other product you can buy.
The MAGIC WAND is a rock solid piece of software. The command structure is simple and logical and complete. We have not tossed in features without thought to the overall design of the package. Nor have we included any feature that is not thoroughly implemented. The programs are crash-proof and completely reliable.

And the system is supported by what we are told is the best user's manual ever produced for microcomputer software. It contains a step-by-step instructional program designed for the novice. The trainee uses sample files from the system disk and compares his work to simulated screens and printouts in the manual. ✓192

TEAC DISK DRIVES

We are pleased to announce that we are now able to offer TRS-80 compatible mini disk drives. These drives are fully compatible with TRSDOS, NEWDOS, and NEWDOS 80 PLUS. The TEAC DRIVE is one of the first Japanese disk drives to appear on the American market. In many ways it is quite superior to its American made counterparts.

$295

$570

Duel Drive In One Enclosure (Cabinet)

Two Drive Cable - $29.95
Four Drive Cable - $39.95

A high-precision lead screw method is used for positioning the head to the correct track. Four motor steps are used for move the width of one track. This improved positioning accuracy greatly reduces the possibility of data error.

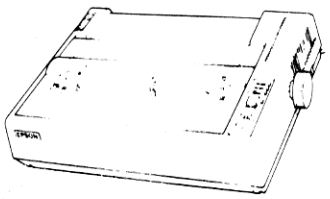
✓484

BUSINESS COMPUTERS

WE HONOR master charge

*TM TANDY CORP.

THE MX-80 NOT ONLY DOES EVERYTHING, IT DOES EVERYTHING WELL.



This is the new Epson MX-80 dot matrix printer. It does just about everything you could ask a printer to do. Quickly. Quietly. Reliably. In fact, for OEM installations, the MX-80 may be the single best, all-round printer you can buy. But that's not the best reason to buy it.

The MX-80 prints bidirectionally at 80 CPS in a user-defined choice of 40, 80, 66 or 132 columns. And if that's not fast enough, its logical seeking function minimizes print head travel time. The MX-80 prints 96 ASCII, 64 graphic and eight international characters with a tack-sharp 9x9 matrix. For a long time. Epson printers are known for reliability and the MX-80 is no exception. But that's not the best reason to buy it either.

The print head has a life expectancy of up to 100 x 10^6 characters, and when it wears out, just throw it away. A new one costs less than $30 and the only tool you need to change it is attached to the end of your arm. The MX-80 is compact weighs only 12 lbs., and the whole unit, including the two stepper motors controlling carriage and paper feeding functions, is precisely controlled by an internal microprocessor. But even that isn't why you should specify the MX-80.

The best reason is this: because Epson makes more printers than anyone else in the world, we can afford to sell each one for a little less.

...Call For Unbelievably 'Low Price

✓317

OKIDATE MICROLINE 80 PRINTER - $479

The Microline is built on a rugged cast aluminum base to withstand the rigors of continuous business use. It is driven by two motors and will run all day with no duty cycle limitations. Microline printers use a dense 9 x 7 dot pattern to produce crisp, clean copies, first copy to last. The seven pins in the head are "fired" using energy stored in tension members. This technology permits the use of short, low mass pins made with an extremely hard alloy. The head produces less heat, thereby extending its life. ✓356

900 C.P.S. PRINTER

That's right nine hundred characters per second. That's the print speed that can be obtained using the new Florida Printer Model 600 C. The 600 C uses a unique "Stored-Energy" print head to obtain a print speed of 600 CPS in normal print font and 900 CPS in a condensed print font. This printer is not inexpensive but it is definitely the fastest dot matrix printer in the world. Call for prices... ✓211

AW...WHAT THE HECK
RAM Memory Chips for the TRS-80

It is the policy of American Business Computers to offer merchandise at the lowest price possible. Serveral months back we began selling RAM Memory Chips for the TRS-80 for $45.00 per set. Someone else sold chips for $44.00. We sold them for $38.00. They sold them for $37.95. So we say "AW ..... WHAT THE HECK!" Let's see the other guys beat this price.

$24

PER 16K SET

These chips are brand new "4116's". These 200 nanosecond chips are fully compatible with all TRS-80 produces. Instructions for insertion are included, however the dip shunts required for converting a 4K Model I to a 16K Model I are not included at this low price.

✓322

Epson.

This printer costs less than $450. just how much less we can't tell you - But if you will give us a call we think you will be pleasantly suprised.

This is the Epson MX-70. The lowest priced dot matrix printer you can buy. Now, that in itself should make it very attractive to a lot of people. But you ain't heard the half of it.

To begin with, the MX-70 has a lot more in common with our now-famous MX-80 than just the name. Like unequalled Epson reliability. And technological breakthroughs like the world's first disposable print head. But frankly, the MX-80 packs a lot more power than some people need. So Epson built the MX-70 to be a no-frills printer. At a no-frills price.

But the MX-70 is still a great little printer. They give you 80 CPS unidirectional printing. Top-of-form recognition. Programmable line feed and form lengths. Plain paper printing. An easy-to-read 5x7 matrix. Self test. And an adjustable tractor feed.

That's what you'd expect from a basic little printer. But here's something you wouldn't expect: the finest graphics package on the market today. Free.

They call it GRAFTRAX II. And it means 480 dots across the page, resolution to 60 dots per inch, and a graphic image free of the jitter and overlap that plagues other printers. You get cleaner grays and finer point resolution.

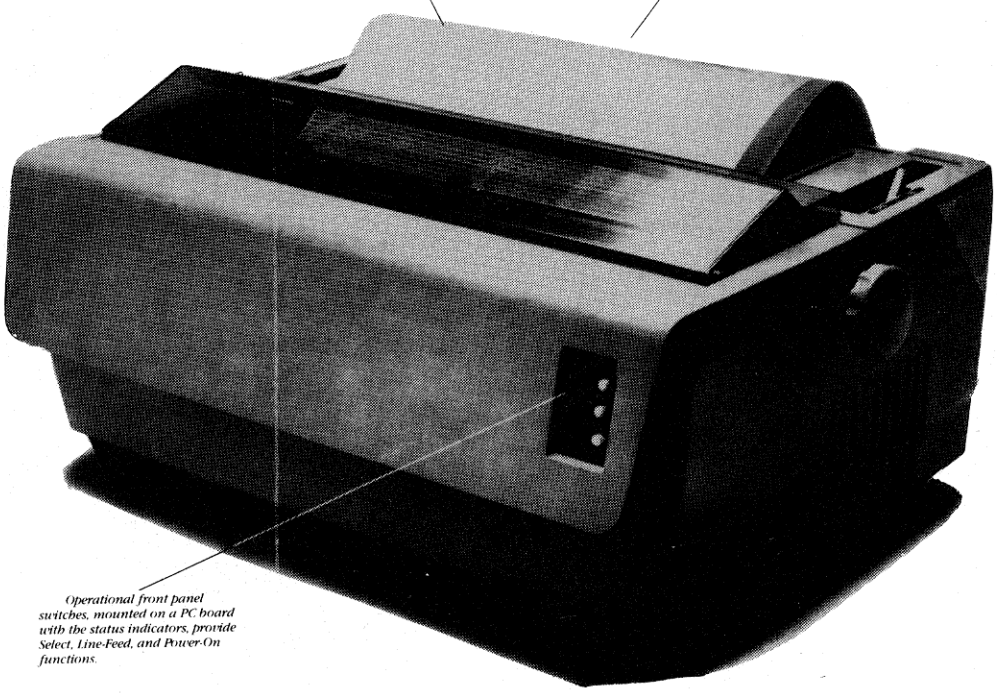
So now you've got a choice. You want more power and extra functions, you buy the MX-80. You want a basic little printer that prints, and keeps on printing, you buy the MX-70. They're both at American Business Computers.

Call for unbelievably low price.

✓196

NEED A LETTER QUALITY PRINTER BUT DON'T WANT TO PAY THE PRICE?

Then American Business Computers Has Just The Printer For You!



The Starwriter Daisy Wheel Printer is designed to fill a distinct gap in the peripheral marketplace. A speed of 25 cps and its low price make it the ideal choice for today's systems designer interested in achieving superior price/performance ratios.

Incorporating the latest LSI technology, the Starwriter is built by one of the world's most respected computer peripheral manufacturers. The printer is furnished complete and ready-to-use, requiring no changes in hardware or software. Starwriter offers an industry standard parallel interface, as well as RS232-C interface. Total plug compatibility and a wide variety of interface matching capabilities help lower the system integration costs for OEMs and end-users.

Using a 96-character wheel, the Starwriter produces letter-quality printing on 3 sharp copies with up to 136 columns. Starwriter offers the highest degree of vertical and horizontal positioning, resulting in the most precise character placement in the industry. The easy-to-change character wheel also makes our printer a perfect choice for international applications. Compatible with sheet feeders, starwriter accommodates paper widths to 381 mm (15") and uses industry standard ribbon cartridges.

Along with a self-test capability and a programmable VFU (Vertical Format Unit), Starwriter furnishes the operator with all desirable status functions, commands and program selectable switches. Panel lamps indicate the current Paper, Select and Power status.

The easy plug-in compatibility of Starwriter and its outstanding print performance makes the Starwriter perfect for TRS-80*, Apple*, and S-100 users.

Starwriter is backed up by a one-year warranty (3 months on parts and labor, 9 succeeding months on parts) and is further supported by a strong, fully trained and technically proficient service organization. The Starwriter is available for immediate shipment in any quantity desired.

For more information, call American Business Computer, 118 So. Mill Street, Pryor, Oklahoma 74361; Telephone 918-825-4844.

*TM of Tandy Corp
*TM of Apple Computer Corp.

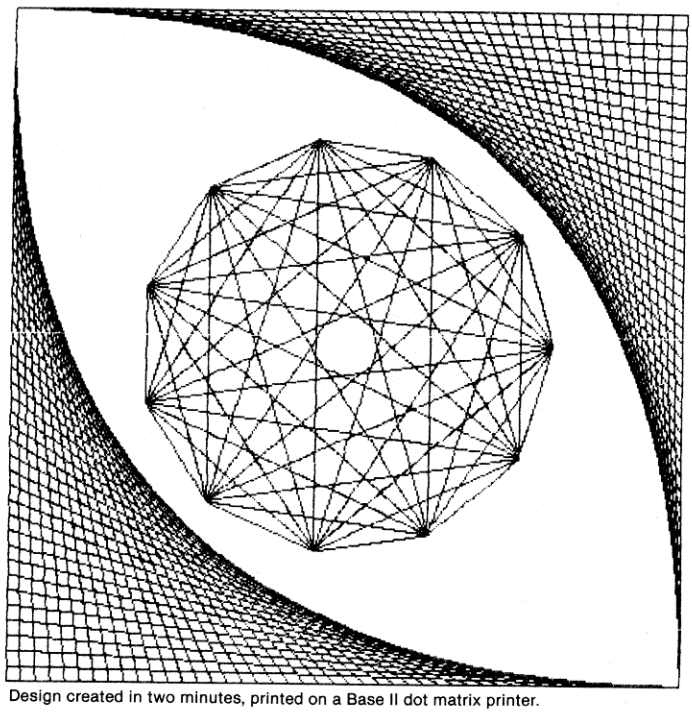
AMERICAN BUSINESS COMPUTERS ✓267

118 So. Mill Street
Pryor, Oklahoma 74361
Telephone 918-825-4844

Dealer Inquiries Invited

Advanced Graphic Techniques—Part II

Bob Boothe
4651 Browndeer Lane
Rolling Hills Estate, CA 90274



Design created in two minutes, printed on a Base II dot matrix printer.

I have always enjoyed creating designs and plotting shapes and surfaces with my TRS-80. I started plotting three dimensional surfaces on the video screen, then went to the printer because of the increased resolution I could get. I developed a program for plotting a picture on many sheets of paper, and then assembling the sheets into one big picture. For my first and only run of this, I made a plot which covered twenty sheets of paper. It took approximately thirty hours of computer time to create it.

Things were getting out of hand: I had to find a way to cut down the time. My first breakthrough was using the graphic capabilities of my Base 2 printer. I created a replica of my twenty page plot by using single dots instead of characters, which took about eight hours to complete.

The number of points which can be stored in memory is staggering. Considering that we have 32,000 bytes and that each dot needs only one bit, 32,000 bytes times eight bits per byte gives us 256,000 points which can be stored. That is a quarter of a million points. I'll bet you never realized that a TRS-80 had that much power.

The first design we will create will be 406 by 406 dots. This size gives very good resolution, and could not be done on the video even if a high resolution system was developed which would allow control over every single dot. A picture this size gives us a total of 164,836 dots which we can use. Estimating that only ten percent of the dots will be turned on in any design, about 16,000 dots will need to be turned on.

It takes about 30 seconds for a FOR-NEXT loop to go through 16,000 loops; it could take several hours to set 16,000 points using a BASIC routine. Machine language seems to be the only answer. However, trigonometric functions are used to create all of my designs. I have never written a cosine routine in machine language, so we have to scratch that plan.

My graphic system provides the best of both worlds—all the designs in this article were created with straight lines. Yes, all the curves are made by combining straight lines in specific trigonometric patterns. Aha!

Each design contains a few hundred straight lines. The endpoints are computed in BASIC, and the lines are drawn with machine language. This way the complicated computations can be done in BASIC, so they can easily be changed and corrected. All the time-consuming and repetitive tasks are done in the machine language program. Since the machine language routine only draws lines as specified by the BASIC program, it never needs to be changed.

Picking Parameters

Before I explain the programs themselves, I am going to explain some of the computations I made before writing the programs. Most of you will need to do some conversions to make the program print on your printer.

I decided to use about three quarters of available memory to store the design, leaving 8K for the programs. The Base 2 printer accepts graphical data for seven dots at a time (bits 0–6). The seventh bit is ignored. In order to make my printout routine as simple as possible, I stored the data in only the first

"Those of you lucky enough to have a Level II TRS-80 with 32K RAM, no disks and a Base 2 printer should be able to run the program as is."

seven bits of each byte and wasted the last bit, just as the printer does. Out of my 24,000 bytes, I used seven dots each, for a total of 168,000 points.

I wanted my designs to be square, so I found the square root, which is about 410. Furthermore, the number should be divisible by seven to make the print-out routine as easy as possible. 406 is a good number, making 58 lines on the print-out and taking about two minutes (graphics are done at half speed). Fifty eight lines times 406 bytes per line gives 23,548 bytes needed to store the design. Those with 16K machines should be able to shrink everything down and squeeze out a smaller picture.

The first problem is to make 406 horizontal dots the same length as 406 vertical dots. Each line on the Base 2 printer consists vertically of seven printed dots and five dots for spacing: Twelve dots per line times six lines per inch is 72 dots per inch. To match this on the horizontal scale, it takes 72 dots per inch divided by six dots per horizontal character (five dots for the character and one for the space) or 12 characters per inch. Fortunately, 96 characters per line is exactly 12 characters per inch. This can all be software selectable by sending a specific series of numbers to the printer.

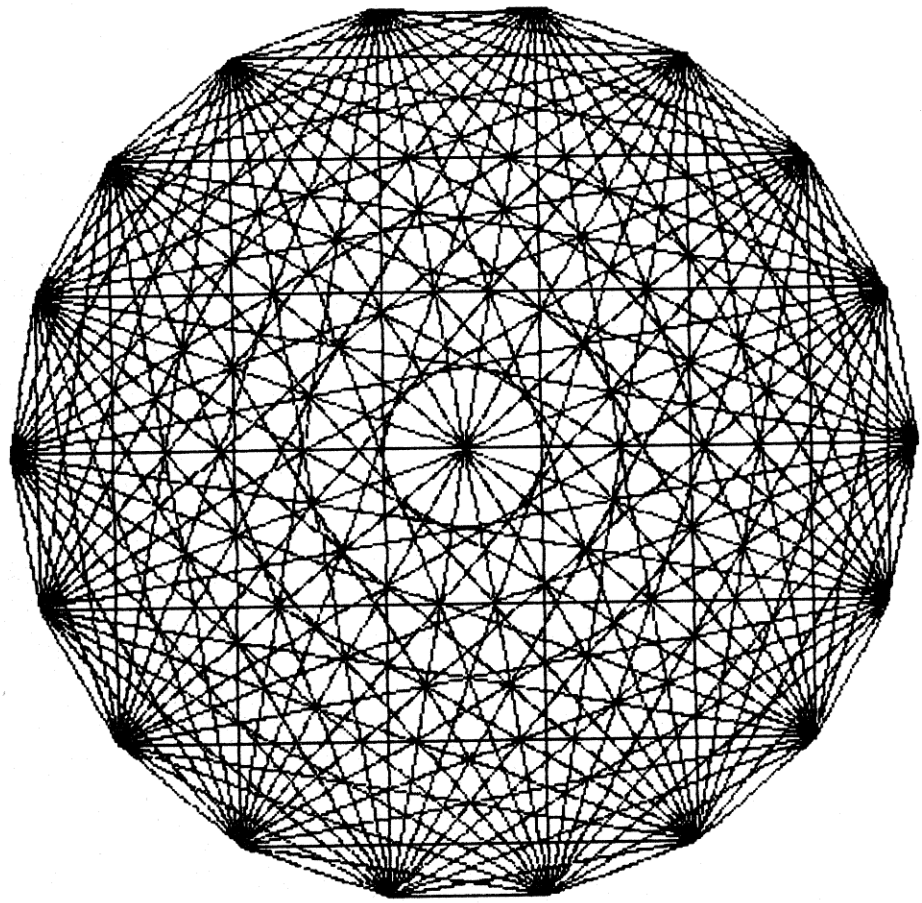


Figure 1: A common computer generated design, created by drawing all the diagonals in an N-sided regular polygon.

Machine Language

Those of you lucky enough to have a Level II TRS-80 with 32K RAM, no disks and a Base 2 printer should be able to run the program as is. Those with other printers and 32K should only need to modify the printing section. If your printer does not have graphics capabilities, you may want to modify the program to use the video monitor (explained in Part III).

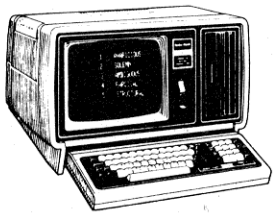
Three disk commands all used in this program. The first is for the line drawing routine; LINE fits very well. The second routine initializes the design memory by filling the entire block with zeros. I call this routine OPEN, since it is the starting process. The last routine is the printing routine, which I call CLOSE because it is the finishing process. The program presented last month POKED the address of our routine into location from the table. This time, since the program will be loaded using the SYSTEM command, the disk commands can be initialized while the program loads.

EDTASM doesn't care where we put the program, so we can load directly into reserved RAM. I set each origin in the program one byte below the corresponding address from the table, to compensate for the jump which has to be saved in order to write the address.

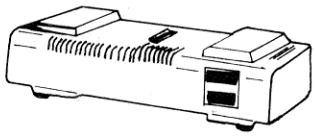
```
100 REM  DESIGN NO. 1
110 INPUT"NUMBER OF POINTS (SAMPLE HAS 18) ";N
120 DIM A(N),B(N)
130 FORT=0TO2*PI-.001 STEP 2*PI/N
140 Z=Z+1
150 A(Z)=COS(T)*200+202:B(Z)=SIN(T)*200+202
160 NEXT T
170 FORS=1TON-1:FORD=S+1TON
180 X1=A(S):Y1=B(S)
190 X2=A(D):Y2=B(D)
270 GOSUB1500
280 NEXT D,S
```

The LINE routine uses four values to draw a line. These are the start and the end of the line for the horizontal and vertical directions. My labels are STARTX, STARTY, ENDX and ENDY. The easiest way to supply these is by POKEing them into the program.

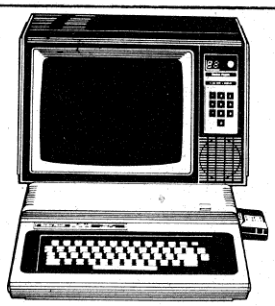
meet a REAL PLUS



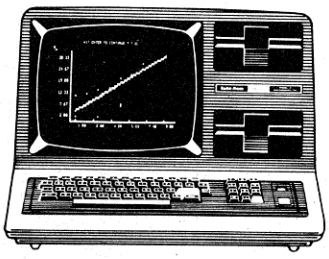
Model II 64K $3375



32K Exp. Int. $362



Color Computer 4K $310



Model III 16K $859

check out these unusual package values for price and warranty

Here are just a few of our fine offers . . . call toll-free for full information.

COMPUTERS

Model II 64K	$3375
Model III 4K LEV I	599
Model III 16K	859
Model III 32K	981.50
+ Model III 32K	915.50
Model III 48K	1104
+ Model III 48K	972
Model III 32K 2 Disc & RS232 c	2149
Color Computer 4K	310
Color Computer 16K	439.95
+ Color Computer 16K	366.50
Color Computer 16K w/extended basic	489
Pocket Computer	199
VIDEOTEX	329
APPLE 48K only	1279
ATARI 800 16K	789

+ Computer Plus New Equipment. 180 Day Extended Warranty

PERIPHERALS

Expansion Interface 0K	$249
Expansion Interface 16K	359
+ Expansion Interface 16K	305.50
Expansion Interface 32K	469.95
+ Expansion Interface 32K	362
16K RAM N.E.C. 200 N.S. chips	39

MODEMS

Lynx Direct Connect	219
COMM 80 Interface	159.95
Chatterbox Interface	239
Telephone Interface II	169

PRINTERS

Line Printer IV	849
Daisy Wheel II	1695
Line Printer VI	999
NEC Spinwriter 5530	2595
OKI DATA Microline 80	499
EPSON MX80	519

DISK DRIVES

Model III 1-Drive	712
PERCOM TFD 100	389
TEAC 40 Track	319

MODEL I 32K E.I., 1st. Drive, Line Printer IV, 10 Diskettes Pure R.S. $1875
combined warranty 1699

MODEL II 64K w/2 Disks, Daisy Wheel II, Scripsit Pure R.S. 6350

MODEL III 48K, 1st. Drive, Line printer IV, Scripsit Word Processor, 10 Diskettes Pure R.S. 2800
combined warranty 2699

COLOR COMPUTER 16K CC w/extended basic cassette recorder, joy sticks, dust cover Pure R.S. 569

POCKET COMPUTER w/interface Pure R.S. 239

ATARI
48K Atari 800, Atari 825 Printer, Atari 810 Disk Drive 2125

APPLE
48K Apple II & Apple II Disk w/controller, D.O.S. 3.3, Printer Card and Cable, Epson MX80 Printer 2510

PLUS real back-up warrantees —

Pure Radio Shack equipment warranteed at any Radio Shack store or dealer. Factory warrantees on Apple and Atari equipment. Other equipment carries manufacturer's warranty or Computer Plus 180 day extended warranty. Combined warrantees carry Computer Plus 180 day warranty or original manufacturer's warranty.

DEALER INQUIRIES ARE INVITED (617) 486-3193

Prices subject to change without notice. Not responsible for typographical errors.

TRS-80 is a registered trademark of Tandy Corp.

call TOLL FREE
1-800-343-8124

computer plus ✓130

Write for your free catalog ...

Dept. D
245A Great Road
Littleton, MA 01460

✓See List of Advertisers on page 306

These values will range from 0 to 405. Because 405 is too large to be stored in a single byte, an entire word will have to be used.

The process used to draw a straight line becomes tricky. Let's take the simplest case first. We want to draw a line from (3,6) to (7,6), a short horizontal line. The points which should be set are: (3,6), (4,6), (5,6), (6,6) and (7,6). A slightly more difficult line is from (8,8) to (11,11). The points for this line are: (8,8), (9,9), (10,10) and (11,11). Consider a line from (2,2) to (6,4); the best points would be: (2,2), (3,2), (3,3), (4,3), (5,3), (5,4) and (6,4).

Try writing a program to draw an unbroken line on the video between any two points, and you will see there is a problem. The third example has a total movement of four units in the X direction and two units in the Y direction. This would mean a movement of one-half Y for each X.

The program uses fractions to determine the amount to move each step. The labels are DIRX and DIRY. The fraction for the X direction is computed in lines 320-420. The registers are first saved with an EXX. Four bytes are used to store each variable used to draw the line: Two bytes for the whole part, and two for the fraction. The fraction or LSW (least significant word) is stored first, followed by the whole part.

The step is computed by subtracting the start from the end value. The difference is used as the step, and is actually divided by 65,536. If the difference is negative, the MSW is also made negative. This procedure is then repeated for the y direction in lines 430-530. Lines 540-760 double both fractions until one is greater than or equal to one-half. This optimization allows the program to operate as rapidly as possible by making the total number of points to be set as small as possible. The process is done by shifting the fractions left until the most significant bit changes from zero to one for positive directions, or from one to zero for negative directions.

The next section of the program draws the line. It first sets the starting point and then adds directions to the start variables until the start is equal to the end. It sets each point as it goes along, and checks to see if STARTX is equal to ENDX after each point is set. The X variables should always meet at the same time, except for the one case of vertical lines. This is why the Y variables are compared in the MAYBE routine at line 1000. If the Y directions are also the same, the registers are restored with an EXX, and the routine returns control to the

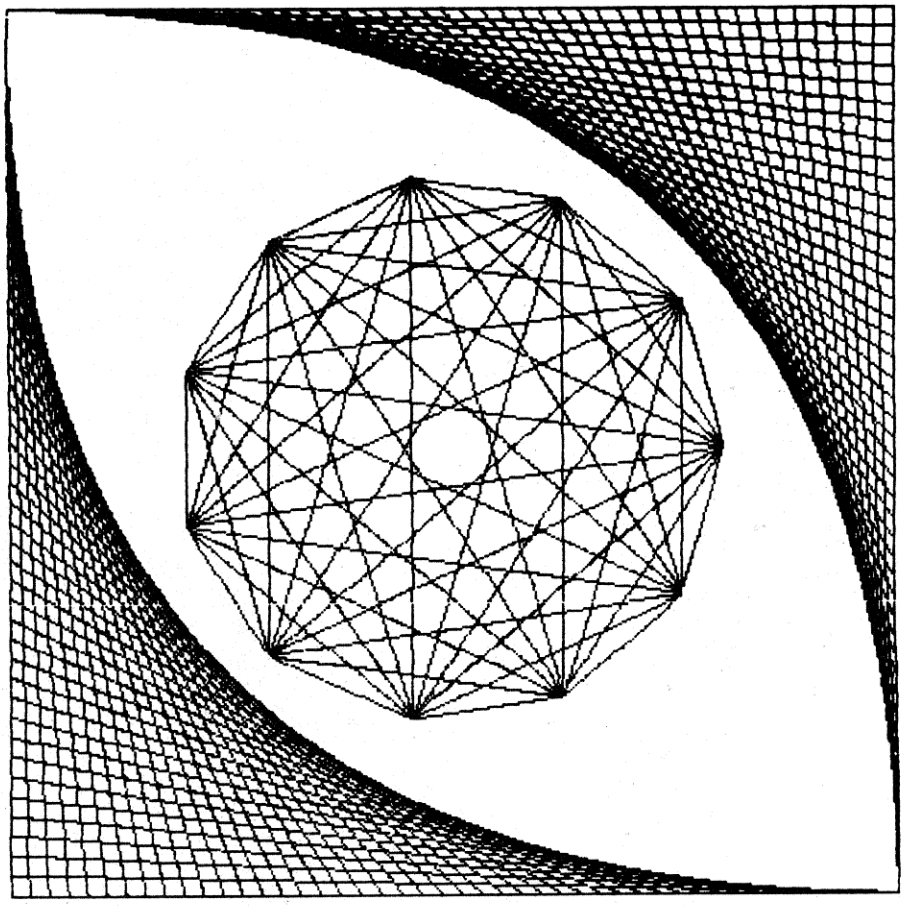
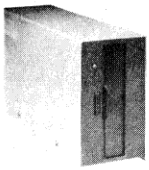


Figure 2: This is the same design which was seen last month. It combines three shapes to form an eye.

```
40 REM  DESIGN NO. 2
50 FOR Q=0TO405STEP9
60 X1=0:Y1=Q:X2=Q:Y2=405
70 GOSUB1500
80 X1=Q:Y1=0:X2=405:Y2=Q
90 GOSUB1500
100 NEXT Q
110 INPUT"NUMBER OF POINTS (SAMPLE HAS 18) ";N
120 DIM A(N),B(N)
130 FORT=0TO2*PI-.001 STEP 2*PI/N
140 Z=Z+1
150 A(Z)=COS(T)*125+202:B(Z)=SIN(T)*125+202
160 NEXT T
170 FORS=1TON-1:FORD=S+1TON
180 X1=A(S):Y1=B(S)
190 X2=A(D):Y2=B(D)
270 GOSUB1500
280 NEXT D,S
```

WE WILL NOT BE UNDERSOLD

DISK DRIVES



FOR TRS-80* Model I

CCI-100 TEAC	5¼", 40 Track (102K)	**$314**
CCI-100 MPI	5¼", 40 Track (102K)	**$319**
CCI-280	5¼", 80 Track (204K)	**$429**

ADD-ON DRIVES FOR ZENITH Z-89

CCI-189	5¼", 40 Track (102K)	**$394**
CCI-289	5¼", 80 Track (204K)	**$499**
Z-87	Dual 5¼" system	**$995**

External card edge and power supply included. 90 day warranty/one year on power supply.

RAW DRIVES 8" SHUGART 801R **$425**
5¼" MPI, TEAC or TANDOM **$ CALL** POWER SUPPLIES **$ CALL**

MORROW DESIGNS/THINKER TOYS™

DISCUS 2D	1 DRIVE	**$ 938**	2 DRIVE	**$1635**
DISCUS 2+2	1 DRIVE	**$1259**	2 DRIVE	**$2245**
DISCUS Hard Disk	M26	**$3990**	M10	**$2999**

DEI CARTRIDGE TAPE BACK-UP

For your hard disk. With either S-100 control card or piggy back board for single board Z-80 computers. **$2995**

DISKETTES — Box of 10 with plastic library case

5¼"	**Scotch**	**$35**	**Maxell**	**$40**	**BASF/Verbatim**	**$27.95**
8"	**Scotch**	**$50**	**Maxell**	**$55**	**BASF/Verbatim**	**$36.00**

PLASTIC CASE–Holds 50 5¼" diskettes **$19.00**
SCOTCH HEAD CLEANING DISKETTE **$25.00**
FLOPPY SAVER **$11.95** RINGS **$6.95**

COMPLETE SYSTEMS

ARCHIVES	64K, 2-Drives, 77 Track			**$5495**
ALTOS	ACS8000 Series			**$ CALL**
TRS-80*	II-64K	**$3499**	III-16K	**$ 899**
TRS-80*	Expansion Interface			**$ 299**
ZENITH	48K, all-in-one computer			**$2200**
ZENITH	Z-19			**$ 735**
TELEVIDEO	920C	**$ 748**	950	**$1049**
IBM	3101 Display Terminal			**$1189**
ATARI	400	**$ 479**	800	**$ 795**
MATTEL	INTELLIVISION			**$ 229**
APPLE PERIPHERALS				**$ CALL**

MONITORS

APF	9" B & W TVM-10			**$120**
BELL & HOWELL	9" B & W BHD911			**$220**
LEEDEX	12" B & W	**$129**	13" Color	**$369**
SANYO	9" B & W VM4509			**$155**
SANYO	12" B & W DM5012			**$226**
SANYO	12" Green Screen DM5112			**$238**
SANYO	13" Color DMC6013			**$416**
ZENITH	13" Color			**$349**

TELECOMMUNICATIONS

LIVERMORE STAR MODEM 2-year guarantee	**$125**
UNIVERSAL DATA SYSTEMS UDS-103	**$179**
D-CAT HARD WIRED DIRECT MODEM	**$189**
AUTO-CAT Auto Answer, Direct Connect Modem	**$229**
D.C. HAYES MICRO-MODEM	**$329**

PRINTERS

NEC Spinwriter
Letter Quality High Speed Printer

R.O.	**$2395**
R.O. with tractor feed	**$2595**
KSR with tractor feed	**$2895**

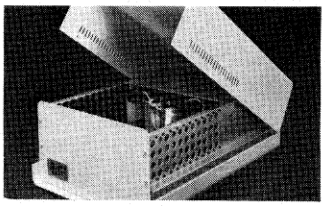
C.ITOH	Starwriter	**$1695**	Starwriter II	**$1895**
EPSON	MX-80	**$479**	MX-70	**$ 399**
PAPER TIGER				
IDS 445	Graphics & 2K buffer			**$ 699**
IDS 460	Graphics & 2k buffer			**$1050**
IDS 560	Graphics			**$1450**
ANADEX	DP-8000	**$849**	DP-9500/01	**$1345**
OKIDATA				
Microline 80	Friction & pin feed			**$ 420**
Microline 80	Friction, and pin & tractor feed			**$ 520**
Microline 82	Friction & pin feed feed			**$ 620**
Microline 83	120 cps, uses up to 15" paper			**$ 849**
CENTRONICS	730 **$ 595**	737 **$ 749**	779	**$ 969**
TI-810				

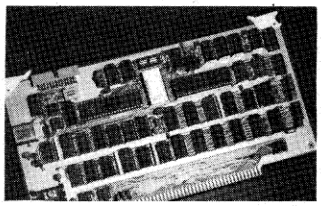
TRS-80* software, compressed print & vert. form control **$1865**

16K RAM KITS

2 for $56 **$30**
200 ns for TRS-80*, Apple II, (specify): **Jumpers** **$2.50**

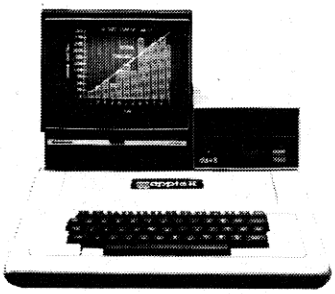
S-100 CALIFORNIA COMPUTER SYSTEMS





MAINFRAME	Model 2200A	**$349**
Z80 CPU	Model 2810	**$269**
MOTHER BOARD	Model 2501	**$106**
16K STATIC RAM, 200ns	Model 2116C	**$309**
32K STATIC RAM, 200ns	Model 2032C	**$619**
64K DYNAMIC RAM	Model 2065C	**$599**
FLOPPY DISC CONTROLLER	Model 2422A	**$359**
EXTENDER BOARD	Model 2520K	**$ 52**
2P + 2S I/O	Model 2718A	**$309**

APPLE ACCESSORIES AND SOFTWARE



VISICALC	**$120.00**
DB MASTER	**$159.00**
Z-80 SOFTCARD	**$269.00**
VIDEX BOARD	**$259.00**
16K CARD	**$169.00**
APPLE JOYSTICK	**$ 49.00**
SUPERMOD	**$ 29.00**
CCS CARDS	**$ CALL**
GALAXIAN	**$ 22.95**
SPACE ALBUM	**$ 35.00**
ASTEROIDS	**$ 17.95**
FLIGHT SIMULATOR	**$ 29.00**
WIZARD & PRINCESS	**$ 28.00**
SARGON 2	**$ 29.00**
HI-RES FOOTBALL	**$ 35.00**
MYSTERY HOUSE	**$ 21.00**

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require two to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

DEALER (NATIONAL/INTERNATIONAL) INQUIRIES INVITED **Send for FREE Catalogue**

The CPU SHOP

✓298

TO ORDER CALL TOLL FREE 1-800-343-6522
TWX: 710-348-1796 Massachusetts Residents call 617/242-3361

5 Dexter Row, Dept.M05M
Charlestown, Massachusetts 02129
Hours 10AM-6PM (EST) Mon.-Fri. (Sat. till 5)

Technical Information call 617/242-3361
Massachusetts Residents add 5% Sales Tax
Tandy Corporation Trademark/®Digital Research

master charge THE INTERBANK CARD

VISA

✓See List of Advertisers on page 306

program.

The SET routine first gets the Y coordinate and divides it by seven to determine how many lines down the point is. The program then adds 406 bytes for each line down in the Y direction. The sum is added to 25603, which is the first byte of the design memory. After this is done, the X coordinate is added to the previous sum. The remainder from the earlier division by seven is equal to the bit which needs to be set. A table provides bit patterns which are combined with the previous contents of the byte being changed.

The OPEN routine is considerably simpler. It puts a 128 in the first byte of the design memory and then copies it through the entire block. One hundred twenty eight is used instead of zero because the printer ignores the seventh bit, and if zero is sent to the printer, the printer will never know it is there.

The PRTOUT routine in lines 1480–1540 is used to check the printer status and then output the byte in the A register. This routine is modified from an incorrect routine in the T-BUG manual.

The first section of the CLOSE routine outputs the control sequence to select 96 characters per line and seven dots per line spacing. Seven dots (actually fourteen half dots) is the standard linefeed spacing when using graphics, eliminating all space between lines. (The control codes used by the Base 2 are industry standard codes, but this doesn't necessarily mean that other printers will work this program.)

Line 1660 sets up the counter for 58 lines of printing. Inside the loop, the printer is told to accept graphical data with the control sequence 27, 99. Once it is in the graphic mode, 85 blanks are sent, then 406 characters, and then another 85 blanks; 85 + 406 + 85 = 576, the number of bytes which must be sent in the 96 character per line mode. Finally, a carriage return is sent to the printer to cause a line feed. This process is repeated for all 58 lines, and then the routine is ended.

The last address of the program should be 25602 (6402H), which is just below the start of the design memory (25603).

The entry point for entering the slash after loading was set at the entry point to Level II BASIC from T-BUG. This sometimes gives an OM error, but it is fixed by a CLEAR. A better way to exit the system mode is to press the break key. Create the source code and load it before you start typing in the BASIC programs.

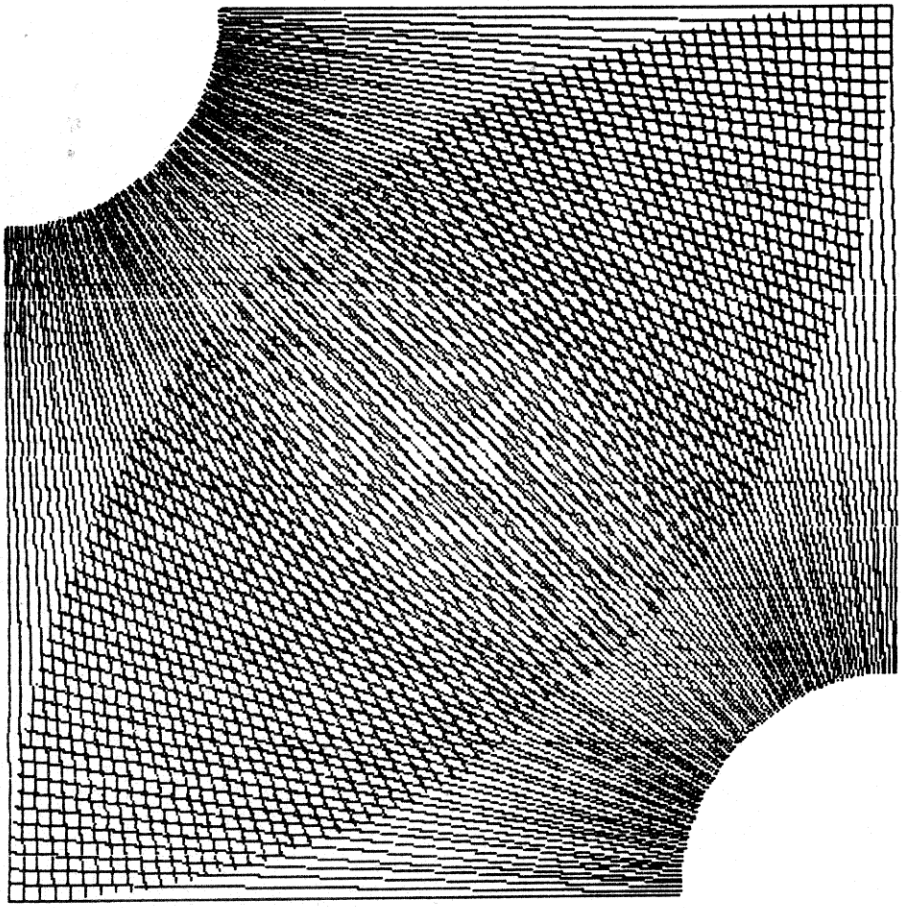


Figure 3: A moire pattern created by the interference of regularly spaced radii of two circles.

```
100 REM  DESIGN NO. 3
110 FOR T=0TOPI/2STEPPI/180
120 X1=FIX(COS(T)*100):Y1=SIN(T)*100
130 X2=FIX(COS(T)*405):Y2=SIN(T)*405
140 GOSUB1500
150 X1=405-X1:Y1=405-Y1
160 X2=405-X2:Y2=405-Y2
170 GOSUB1500
180 NEXT T
```

By the way, I've discovered an easy way to load system programs. Instead of typing EDTASM to load the Editor/Assembler, you can type E, ED, EDT, EDTA, EDTAS, or even EDTASMBLER. I don't know why this works, but you might as well use it. Don't forget to set memory size to 25239.

Back to BASIC

Program 1 is a simple BASIC routine which controls the machine language routines. Line 20 contains the OPEN which clears the design memory. If this statement is left out, each new design will be added to the previous contents of the memory, mak-

"My original intention was to produce a square spiral in which the distance between the lines increased as the length of the sides grew longer. I ended up with this design which I call "The Tunnel."

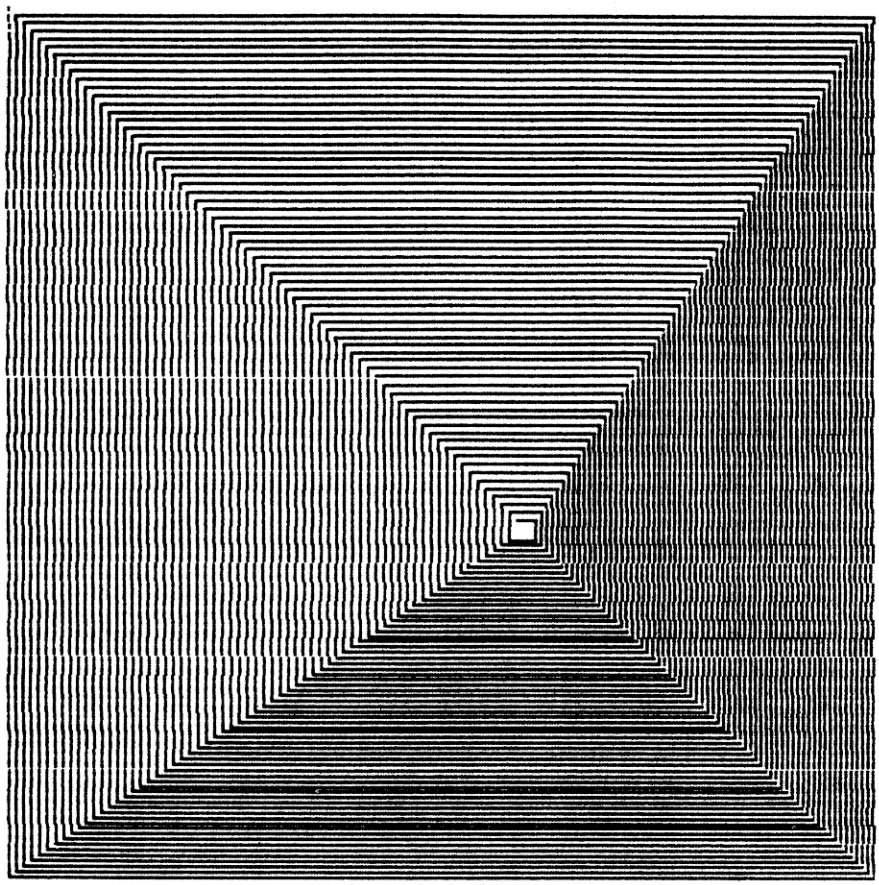


Figure 4: "The Tunnel" is a square spiral.

ing a genuine mess. Line 30 sets the value of π, which is used in almost all of the designs. The empty section from line 31 to line 999 can be used for writing individual design programs. Line 1000 provides an opportunity to stop a design before it is printed. Line 1010 contains the CLOSE routine which prints the design on the printer. Once the printing is started, there is no convenient way to stop it.

Line 1500 is the BASIC portion of the LINE routine. At the start in line 1510, a < sign is printed to signify that the routine was started. These signs will help you estimate the number of lines which are drawn in each design. For example, if only three symbols were printed, there was probably an error in the program and it should be stopped. The next four lines check to see if a value is out of range. If a number is too large or small, the program is terminated. Line 1560 checks to see if the two endpoints of the line are the same. If they are the same, a warning message is printed, but the program is not ended.

```
100 REM  DESIGN NO. 4
110 X1=270:Y1=270
120 FORQ=1TO64
130 X2=X1+5*Q+2:Y2=Y1
140 GOSUB1500
150 X1=X2:Y1=Y2+5*Q+3
160 GOSUB1500
170 X2=X1-5*Q-5:Y2=Y1
180 GOSUB1500
190 X1=X2:Y1=Y2-5*Q-6
200 GOSUB1500
210 NEXTQ
```

Spiral designs usually have values too

BUSINESS/ACCOUNTING SOFTWARE

'S'ERVICE 'O'RIENTED 'A'CCOUNTS 'R'ECEIVABLE

"SOAR" is a combined time reporting/accounts receivable system designed for service organizations. Transactions input to the system include charges to, and receipts from customer accounts. Employees charge time and/or dollar amounts against specific tasks codes. Pre-established inputs are employee rate, task hourly rate, task flat charge, and task rounding factor.

Outputs produced include:

**updated customer file — including balance, last posting, and last receipt amounts*
**statement summary — by customer and task code*
**detail transaction report*
**employee and task summary — with revenue & percent*
**database reports — for employee, customer and task code databases*
**statements (optional) — programmed to suit your forms (available at additional cost)*

Monitor and control your valuable resources with this system for only $395. (Order product code: SOAR)

GENERAL LEDGER/CLIENT WRITE-UP SYSTEM

Our General Ledger/Client Write-up System is a proven, quality product used by several Accounting firms and other Businesses.

**features departmental financial statements*
**contains budget provisions*
**permits up to 500, user-defined chart of accounts*
**allows for transaction editing*
**retains standard journal entries*
**accepts only balanced batches of transactions*
**provides easy-to-follow audit trail*
**uses conventional accounting symbols*
**includes user documentation easily understood by present employees*

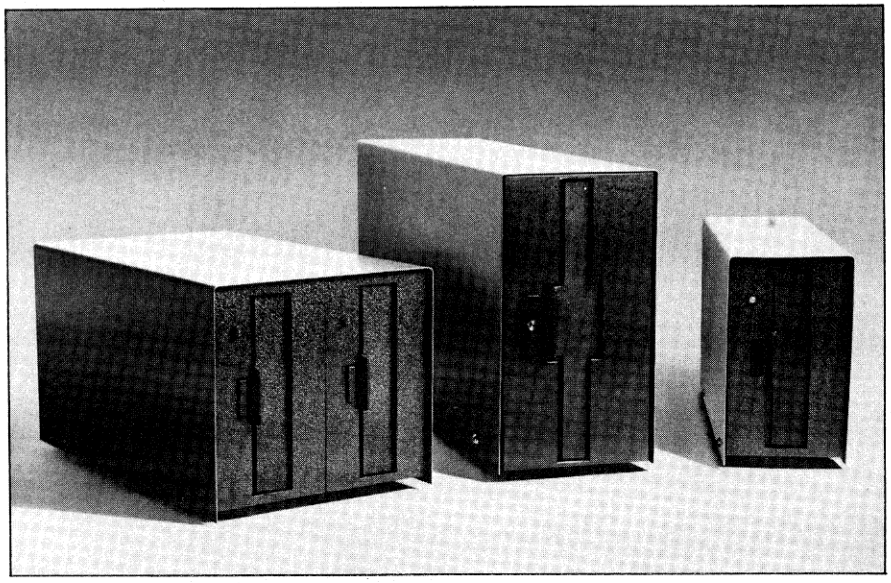
Several reports can be generated by the system including:

**transaction audit reports*
**trial balance*
**income statement (profit & loss statement)*
**balance sheet*
**budget report*
**chart of accounts*

Incorporate speed and accuracy into your business record keeping by ordering our General Ledger System today for only $495. (Order product code: GLS)

TASK ✓147
Computer Applications Inc.
4810 LARCHVIEW DRIVE, DAYTON, OHIO 45424
VISA (513) 233-5515

Product Code _____
Company _____
Representative _____
Address _____
City _____ *State* _____ *Zip* _____
Phone _____ *Computer Model (circle) 1 2 3*
Credit Card Number _____ *Exp.* _____



More power to you.

Disk drives, hardware and software— now more affordable *and* more available!

NOW IN STOCK! MODEL III DISK CONTROLLER BOARDS!

All retrofit packages include circuitry, power supplies, mounting brackets, cables and everything required to turn your Model III into a reliable, disk-based system. 100% compatible with Radio Shack hardware!

AM-1 — Supports 4 single-sided, double-density 5¼-inch disk drives **$445**

AM-2 — Supports 4 double-sided, double-density 5¼-inch disk drives **$545**

AM-3 — Supports 2 internal 5¼-inch single-sided, double-density disk drives and 2 external 8-inch single-sided, double-density disk drives **$645**

TRS-80™ SOFTWARE

MAKE 80©
Converts standard 35 or 40 track diskettes into 80-track-readable diskettes **$14.95**

Model III TRSDOS
40-track Model III TRSDOS & manual **$20**
80-track Model III TRSDOS & manual **$35**

Complete Service Center:
Speedy repairs, including modified TRS-80's.

New Store Hours:
Monday-Friday 10-6, Sat. 10-5

™TRS-80 is a trademark of Tandy Corp.

SPECIALS!

SAVE ON COMPLETE DISK DRIVE PACKAGES!

5¼-inch drives
40-track MPI 51 with case, power supply and extender cables **$320**
80-track MPI 91 with case, power supply and extender cable **$425**
Dual-headed 80-track drive with case, power supply **$550**

8-inch drives
Single Siemens 8-inch drive with single case & power supply **$695**

TEAC DISK DRIVES— THE BEST WE'VE SEEN TO DATE!

Teac 40-track disk drive
Call for our low price!
Teac 80-track disk drive
Call for our low price!

PRINTER SPECIAL!

Epson MX-80 Printer
Call for our low price!

The power behind the drives©

✓ 452

A.M. ELECTRONICS, INC.
3366 Washtenaw Ave.
Ann Arbor, Michigan 48104
(313) 973-2312

NEW TRS-80™ MODEL III! NOW WITH DISK DRIVES!

Model III with dual 80-track disk drives—704K of reliable disk storage on only two drives!
- Features two double-density 80-track drives
- 48K RAM
- Includes A.M. Electronics controller board and versatile MAKE80© program
- Complete, ready-to-run

Now only **$2295!**

The Ultimate Small Business Computer: Model III with four dual-headed 80-track disk drives!
- Features four drives
- 48K RAM
- 2.8 Megabytes reliable disk storage
- Includes A.M. Electronics controller board and versatile MAKE80© program
- Complete, ready-to-run

Now only **$3,795!**

CASES & POWER SUPPLIES

5½-inch enclosures
Single drive unit case and power supply **$85**
Dual drive unit case and power supply **$120**
(Extender cables $15 each extra)

8-inch enclosures
Single drive unit case and power supply **$150**

Attention OEM's & Distributors:
Call us for details on our attractive pricing!

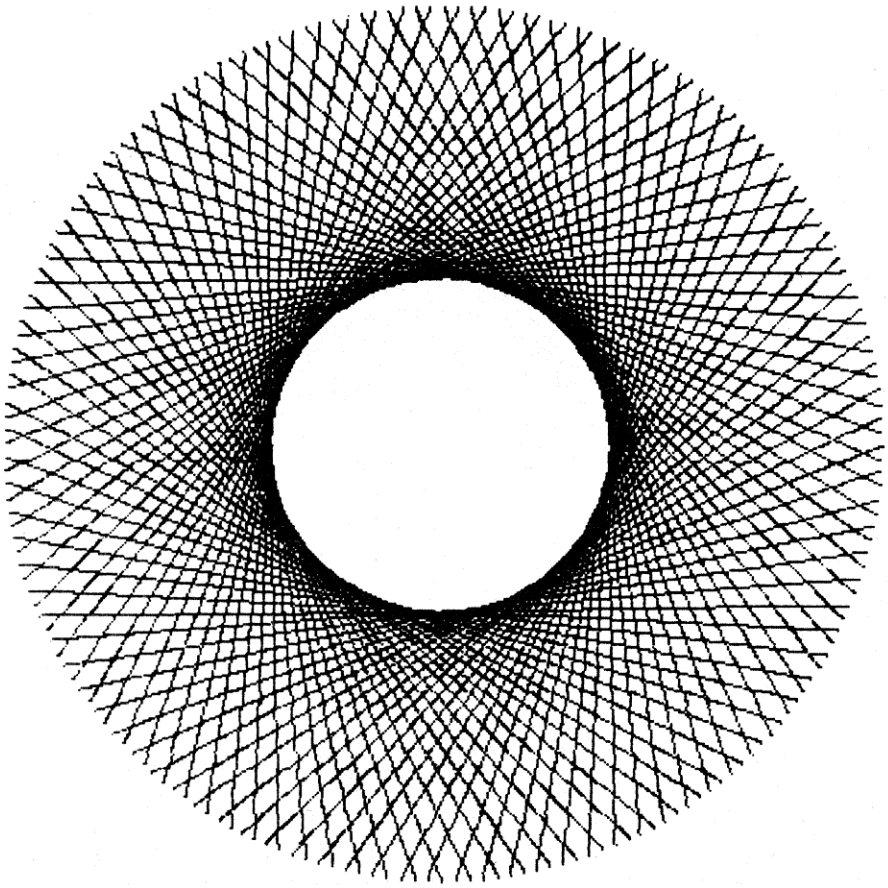


Figure 5: A very simple disk made with one hundred straight lines.

```
100 REM  DESIGN NO. 5
110 FOR T=0 TO 2*PI STEP PI/50
120 X1=COS(T)*200+202:Y1=SIN(T)*200+202
130 A=T+3*PI/4
140 X2=COS(A)*200+202:Y2=SIN(A)*200+202
150 GOSUB 1500
160 NEXT T
```

close together in the very center of the design. These checks are important because if two points are the same, both directions will be zero, and the optimization portion will become an endless loop, all bits in the fraction being zero. The range checks prevent the routine from drawing lines through forbidden territory such as the area containing the program.

The LINE routine should be provided with the value of points (X1,Y1) and (X2,Y2). After these values are checked for validity, they are divided into LSBs and MSBs. These are POKEd into the most significant part of the machine language routine's variable section. If you modify the program, you will need to adjust these POKE addresses. Be careful when you type this section because one wrong POKE can cause real problems. Line 1660 calls the LINE routine, and the last two lines print a > sign and return to the calling program.

Turn your Micro into an electronic and security controller with our new...

TRS-80 INTERFACE

To Order: Send $59.95 plus $2.50 for shipping and handling

Illinois Residents add 6% tax)

TRS-80 Software (Specify Tape or Disk) $10 with purchase of Micro Commander

$59.95

90 Day Warranty Assembled & Tested;

COMPUTER CONTROLLED - REMOTE CONTROL
Now an inexpensive and direct carrier current interface between the TSR-80 and the BSR X-10 remote control modules. The **MICRO COMMANDER**, X-10 modules and your computer can control your lights, appliances, motors, TV, stereo, heaters, alarms, fans, pumps, etc.

COMPUTER CONTROLLED - SECURITY
Add a new dimension to your security system. Place your home under control of your computer real time clock while you are on vacation. Add an input port to your computer and intelligence looms. With switches on doors or windows your computer can welcome guests or frighten intruders.

EASY TO USE - NO WIRES TO RUN
Total control of all X-10 modules. Utilize all 256 house and unit code combinations. Direct interface to AC power line. No command console to purchase. No sonic link. Plugs directly into TRS-80 Model I (Level II or Disk) cassette jack or any 1 bit input and 1 bit output TTL port.

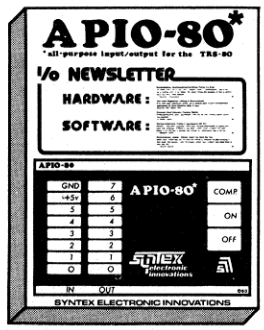
MANUAL INCLUDES SOFTWARE LISTINGS

NEW "PORT C" Real time C-O-N-T-R-O-L software for all TRS-80 Mod. I (Lv.II or disk). Control your MICRO COMMANDER or output ports with respect to real time and/or input port triggers. Save schedules on tape or disk.

CONTACT US FOR BSR X-10 PRICES

INTERFACE TECHNOLOGY ✓319
P.O.Box 383, Des Plaines, Il 60017
Phone (312) 297-2265

EXCITING NEW uses for the TRS-80*



all purpose INPUT/OUTPUT PORT + teaching newsletter

- the most useful peripheral
- don't spend more for less

$45

→ 8 outputs 6 inputs
→ assembled & tested PC board
→ customizing kit included
→ LII Basic or LI T-Bug
→ WE TEACH YOU HOW

with the APIO-80 newsletter subscription you will learn how to use the TRS-80 for:

* home security * robotics * test equipment simulation * printer int. * voice I/O * remote control * human and botanical interfacing * analog interface * light pen * amateur radio * telephone interface * model railroad * computer music * BSR I/O *

and a multiplicity of other uses
WE don't just say it, we DO it!

INSTANT-MAIL RECORDING LINE

SYNTEX electronic innovations
for more info. call 717/733-4769
Box 4034 LANCASTER PA 17604

*TRS-80 IS A TRADEMARK OF TANDY CORP. (C) 80 BY SYNTEX ELECTRONIC INNOVATIONS

80-16134-03

✓139

✓See List of Advertisers on page 306

THE BOOKKEEPERS

FOR INFO CALL (603)-447-2745

Full Charge Bookkeeper—48K, 3 DRIVE, w/ALPHA	**$129.95**
Intermediate Bookkeeper—48K, 2DRIVE & Printer	**$109.95**
Cheap Bookkeeper—32K, 2DRIVE & Printer	**$ 89.95**

All Above Are Daily Journal—G/L Systems

Ann Rose, our Accounts Receivable Clerk—
48K, 2 DRIVE & PRINTER _____ **$150.00**

STURDIVANT & DUNN, INC. ✓82
BOX 277, 124 WASHINGTON ST., CONWAY, NH, 03818

Bayesian Investment Services

Send for free catalog discussing TRS-80 programs available for evaluating:

Options & Futures
Stocks & Bonds
Convertible
& Other Hedges
Portfolio Position
Tax Positions
Market Timing

Write or call:

Bayesian ✓186
Investment
Services
Dept. H3
757 Santa Rosita
Solana Beach, CA 92075
(714) 755-6225

THE MICRO CLINIC

EVERY MODEL I DISK SYSTEM NEEDS A FLOPPY DOCTOR!

Double-density recording (using the Percom Doubler**) and 77/80 track drives put greater demands on your TRS-80* and make it imperative that you assure yourself of data integrity BEFORE committing it to disk. THE FLOPPY DOCTOR 3.0 is the **only** machine language diagnostic which can test your Model I in either single density or, if you have a Doubler**, in double density. This program is a comprehensive test of every sector on every track of 35, 40, 77, or 80 track drives, single or double sided; checks drive motor speed; use your computer as an intelligent disk exerciser; MORE! Also includes memory diagnostic and 16-page instruction manual.

*TM Tandy Corp. **TM Percom Data Co.

PRICE: $24.95
Add $1.00 P/H
CA Add 6% Tax

On diskette for a min. 16K single disk system - no other restrictions. Coming soon for Model III! VISA/MC include card #, exp. date, signature.

✓214

THE MICRO CLINIC • 17375 Brookhurst • Suite 114 • Fountain Valley, CA 92708 • 714-962-0621

GO PIGGYBACK!

CENTRONICS

ADD lowercase with our PLUG-IN piggyback board!

9WX7H Dot Matrix $135
5WX7H Dot Matrix $ 95

TWO complete character sets on board:
96 character ASCII **PLUS** choice of
128 character APL, TRS-80/H-19 Graphics or
Scientific. (Customer defined: add $50/set).

Most printers convertible: specify logic board #

SYDNEY SEZ:
Shop Comparatively!

✓368

DSE **Digital Systems Engineering**

12503 King's Lake Drive, Reston VA 22091 (703) 620-2994

ALSO AVAILABLE: New Centronics and Integral Data Systems printers at 15-20% below list; also, used printers of several makes. **Call for information!**

MasterCard, VISA, Check, MO, PO — All products waranteed 90 days

PURE FIG GOODNESS!

Now you can use Forth on your TRS-80 Model I with 16K and a single disk. This is a stand-alone version of the widely accepted Forth Interest Group Model 1.1 with the standard Forth editor. Extensions include disk format/backup, upper and lower case, output to parallel or RS-232 printers, and an 8080 assembler/disassembler. Documentation includes an introduction, glossary, and every single line of the system, including disk drivers and boot up code, all written in Forth!

TRS-80 fig-FORTH for $49.95

Add 2.50 for shipping.
Ca. res. add 6% for tax.
Order from:

NAUTILUS SYSTEMS

✓55

P.O. Box 1098, Santa Cruz Ca. 95061
TRS-80 is a trademark of Tandy Corp.

"Four of the designs presented in this article are not all like I had planned. It turns out that the accidental designs are often the best. . ."

To use this routine, put the endpoints of a line in X1, Y1, X2 and Y2 and then GOSUB 1500. Never type the word LINE without having previously POKEd values into the program, or the program will hang up.

If It's Good, It's Wrong

Four of the designs presented in this article are not at all like I had planned. It turns out that the accidental designs often look the best, however. "If it's good, it's wrong" might be a good rule to add as one of Murphy's corollaries.

Fig. 1 is a commonly seen computer design. It consists of an N-sided regular polygon with all of the diagonals connected. It can be done with any number of side points, but figures with more than 25 points start to become too dark. Odd numbers make designs with a blank circle in the center, while even numbers have a filled center.

Line 110 asks for the number of side points, and line 120 dimensions the array with enough space. A is the X coordinate of

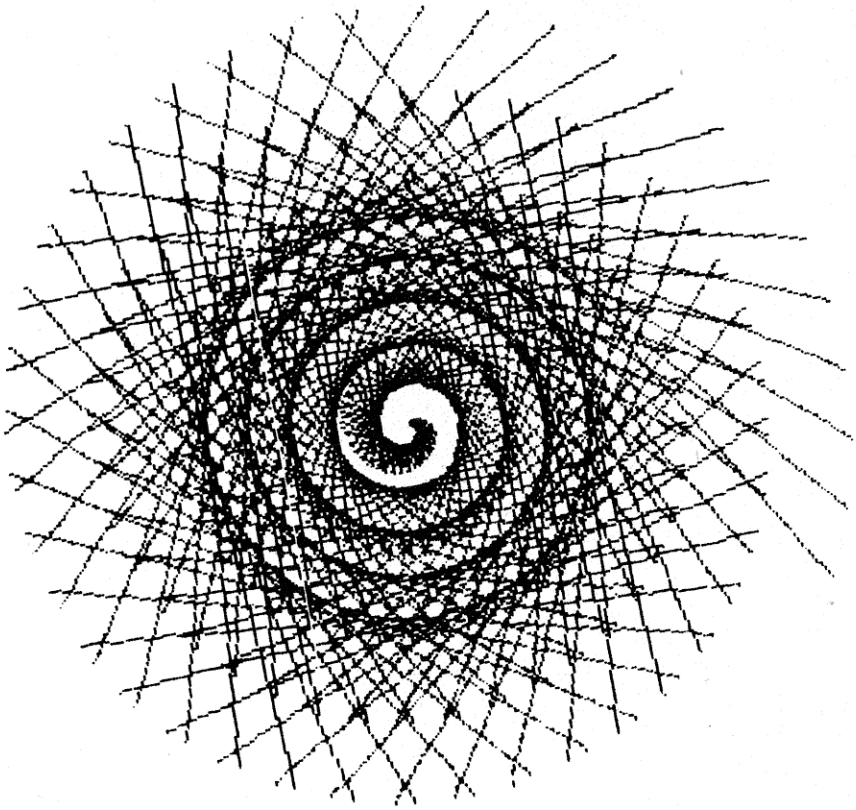


Figure 6: An overlapping spiral made of two hundred lines.

```
100 REM  DESIGN NO. 6
110 FOR T=0 TO 10*PI STEP PI/20
120 X1=COS(T)*5*T+202:Y1=SIN(T)*5*T+202
130 A=T+2*PI/3
140 X2=COS(A)*5*A+202:Y2=SIN(A)*5*A+202
150 GOSUB 1500
160 NEXT T
```


THE PATCH™

FOR THE TRS-80 MOD I

DUALCASE*

UPPER/lowercase, full time from power-up; **NO** software; Standard typewriter keyboard operation (shift to UPPERCASE); Control characters can be displayed; 128 Total character set plus full graphics.

KEYBOARD DEBOUNCE*

Extra keyboard debounce, full time from power-up; **NO** software. If dirty keys are a problem, this is for you. No charge.

BLOCK CURSOR*

Replaces the underline style cursor directly. Easier to locate on a full screen. NO distracting blinking. No charge.

SHORT CASSETTE LEADER*

For tape based systems. Does NOT change baud rate. Only shortens recorded leader. Saves four seconds of waiting time. Great for data files! No conflict with high baud rate tape systems. $10.00 extra.

ELECTRONIC SHIFT-LOCK*

No extra keys or switches. Simply tap either shift key, UPPERCASE lock, normal shift unlocks. $30.00 extra.

SWITCHABLE*

Offers peace of mind. Toggles between original factory operation and "PATCH" enhanced. $25.00 extra.

Call Now (208) 883-0611

CECDAT, INC. ✓62
P. O. Box 8963
Moscow, ID 83843

Name .....
Street .....
City .....
State ..... ZIP .....
☐ Check, Money Order, Bank Draft
☐ VISA, MASTERCHARGE, Purchase Orders (add 3%)
Card/PO No. .....
Expiration Date .....
Today's Date .....
You must check one:
☐ "MEM SIZE" ☐ "MEMORY SIZE"
THE PATCH $69.97
TOTAL OPTIONS. . . . .
ID Sales Tax 3% (Id Res) .....
Ship. & Hand. @ 2.50 ea. .....
COD ADD $2.00 ea. . . ..
TOTAL ORDER . . . .
Price valid through April 30, 1981
*TRS-80 is a trademark of Tandy Corporation.

✓See List of Advertisers on page 306

Fantastic New Tool
for
Voice Synthesis
NO EQUAL ON THE MARKET

This peripheral adds high quality communication to the following:

TRS-80

S-100 Bus systems

Other 8 bit processors

The TLP-52 can give:

High quality speech (up to 800 words)

Phonetic speech (unlimited vocabulary)

Software generated speech

Voice recognition

From $200

For more information contact:

The Learning Place
5620-176th S.W.
Lynnwood, Washington-98036

✓198

THE
QUIZ
MOVIES
TELEVISION
SPORTS

NEVER EVER REPEATS GAMES

HUNDREDS OF QUESTIONS

3 LEVELS — PERSONAL SCORE PER GAME

ENTERTAINS ANY AGE

TRS-80-16K LEVEL II

Acadamy Awards / Famous Movies... $ 9.95
Emmy Awards / Famous TV Shows.... $ 9.95
Pro Football / Baseball Records..... $ 9.95
ALL $19.95

✓304

QUARP PUB'S
P.O. BOX 7416
OXNARD, CA. 93031

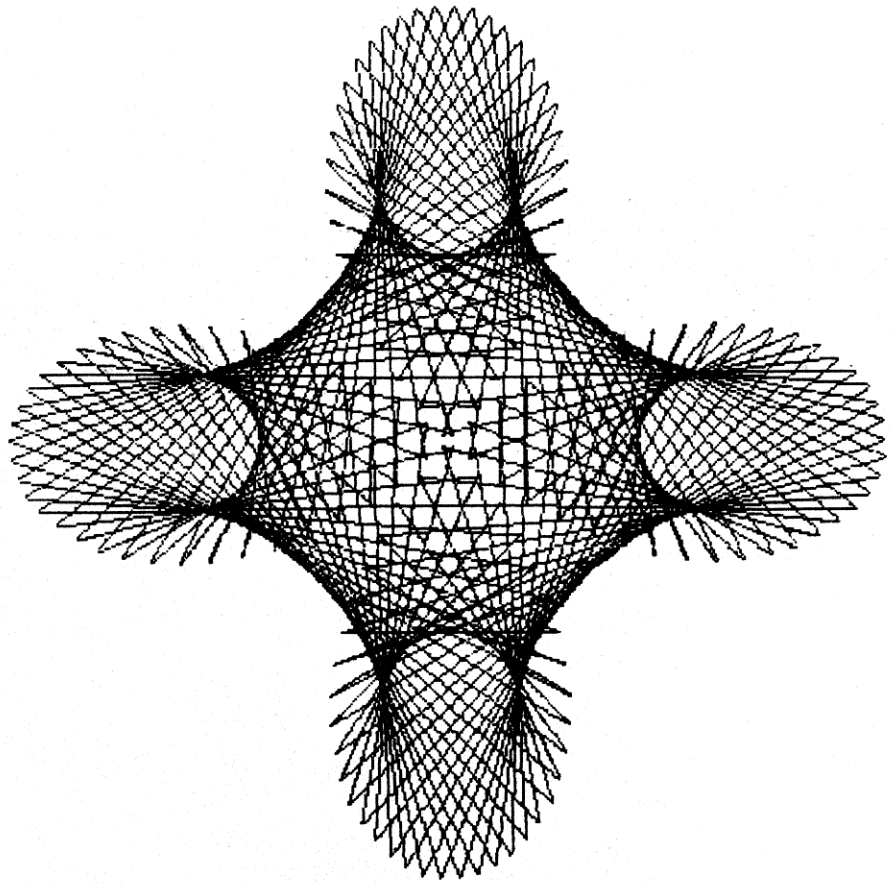


Figure 7: This figure used polar coordinates, and is based on a four leaf rose.

```
100 REM  DESIGN NO. 7
110 FORT=0TO2*PI STEP PI/75
120 R=COS(2*T)*200
130 X1=COS(T)*R+202:Y1=SIN(T)*R+202
140 A=T+PI/3
150 R2=COS(2*A)*200
160 X2=COS(A)*R2+202:Y2=SIN(A)*R2+202
170 GOSUB 1500
180 NEXT T
```

the vertices and B is the Y coordinate. Lines 130-160 compute the position of all of the vertices. Since all of the vertices are on a circle, the X coordinate can be found by using the cosine of the angle theta, and the Y coordinate can be found with the sine.

A small number is subtracted from two π in line 130 to stop the angle two π from being used, because zero is the same angle. (Remember, the computer uses radians instead of degrees).

Line 170 combines all the vertices in all possible combinations. The values of the endpoints are then assigned to the variables, and the LINE routine is called. After this section of the program is completed, the program will ask whether or not to continue. If everything seems all right, press

enter and pray that the CLOSE routine works.

Fig. 2 uses the same program as Fig. 1. Line 150 was changed to make the center design smaller. The center design has eleven vertices. The first portion of the program draws both corner designs. I originally planned to have the center design tangent to the insides of the corner designs, but the insides of the corner designs do not actually form circles as I expected.

Fig. 3 is a moire pattern created by the interference of regularly spaced radii of a circle. Each endpoint can be easily calculated by using the sine and cosine of the angle theta (T). The corners were not filled because they are almost entirely black. Change line 120 to "X1 = 0:Y1 = 0", and you will see the difference.

This type of pattern can be created with

```
100 REM  DESIGN NO. 8
110 FORT=0TO2*PI STEP PI/60
120 R=COS(2*T)*200
130 X1=COS(T)*R+202:Y1=SIN(T)*R+202
140 A=T+PI/2
150 R2=COS(2*A)*200
160 X2=COS(A)*R2+202:Y2=SIN(A)*R2+202
170 GOSUB 1500
180 NEXT T
```

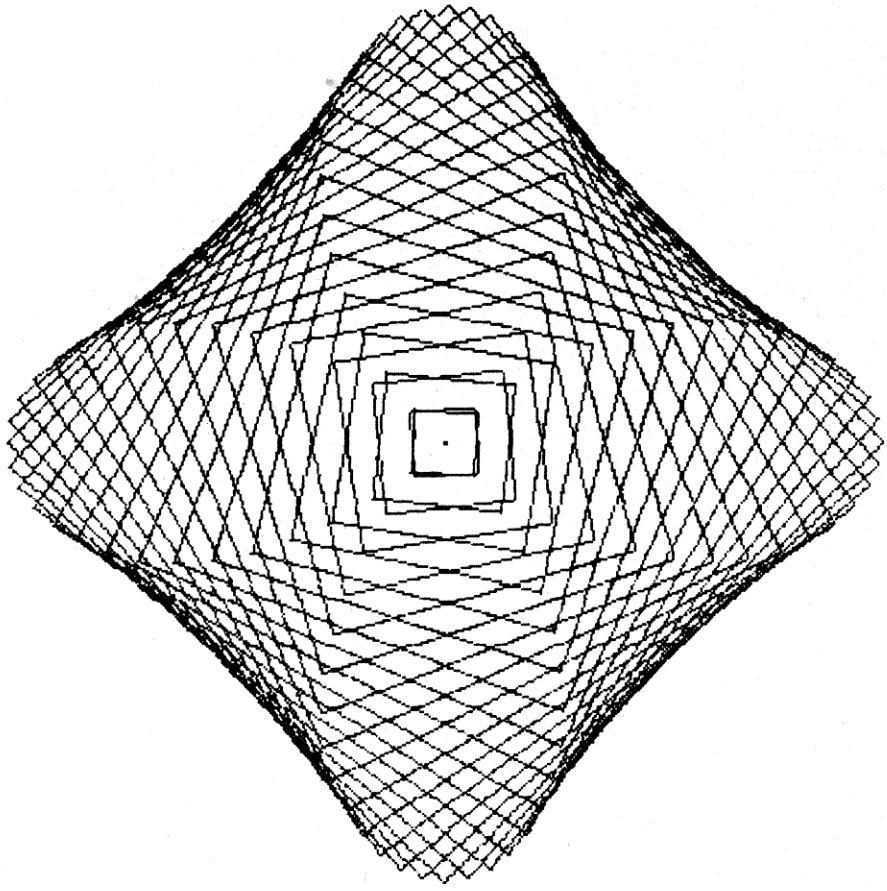


Figure 8: This figure is completely made of squares.

FILETRAN Transfers your TRS-80 Software to CP/M

- Machine language **COM FILE** directly compatible with your **CP/M** system.
- Automated terminal configurator.
- Memory displayed in both **HEX** and **ASCII.**
- Any disk Sector-Selected and displayed in both **HEX** and **ASCII.**
- Transfers both data and program files by file name byte by byte.
- Newly created files scanned for potential errors between level **II BASIC** and **MBASIC** 5.0 or later.
- **CP/M** files scanned for any selected string.
- Searches any program for all occurrences of any string.
- Generates a variable cross reference. Invaluable feature for any system level conversion and debugging.
- Displays both **CP/M** & **TRSDOS** directories.

FILETRAN Disk and Manual TRS-80 I or II $99
Transfer either way from CP/M TRSDOS for Model I $149
Manual alone (Price credited to purchase) $20
Add $2 shipping and 6% sales tax in California.

Order **FILETRAN** Today

☐FILETRAN Disk and Manual
☐2-Way Xfer feature for Model I
☐Manual alone
☐Send descriptive literature

My check is enclosed for $_____
Name _____
Street _____
City _____
State _____ Zip _____
☐VISA ☐M/C _____
4 digits above name
Card# _____
Signature _____

Send to

BUSINESS MICRO PRODUCTS

609 Livermore Ave.
Livermore, CA 94550 ✓382
(415) 449-4412

✓See List of Advertisers on page 306

Applied Economic Analysis

Dr. David Chereb

A noted authority on microcomputing, Dr. Chereb has developed these software systems for TRS-80® users.

BUSINESS PLANNING & FORECASTING PACKAGE

This is the most powerful and comprehensive fore—casting system available for any microcomputer.

■ **COMPREHENSIVE**
This package can fully analyze all your important data. Whether you want to find the trend line for your sales and plot the results or build a simultaneous equation forecasting model, this system will do the job. This is a product you will grow into, not out of. The package contains several forecasting methods to fit your precise needs, and includes:

- Advanced Multiple Regression with Auto Correlation correction
- 10 Data Transformation options
- Disc Data Management System
- Adaptive Filtering option... And much more

While these are sophisticated techniques, this package has been designed to be easily used by the non technical businessman. Small businesses through large corporations have reaped the benefits of AEA's Business Planning & Forecasting Package (BPFP).

■ **VERSATILE**
With the "BPFP", you can create a data series, store it on a disk, and analyze the data by using the various system modules. The results of the analysis can then be listed as a table or plotted as a graph. As an option, results from the "BPFP" can be stored on disk for use as a VISICALC® File.

Applied Economic Analysis
P.O. Box 302
Allamuchy, NJ 07820
(201) 852-3573

■ **CONVENIENT**
To use the package, just load "BPFP" and you're off. Every part of the process has a menu to simplify responses. A second disk in the package, the Econdata File, covers over 30 vital topics, including the GNP, retail sales, money supply, and mortgage rates from the 1st quarter of 1955, through the 4th quarter of 1980. Users will also receive our User Notes for the "BPFP", which contain useful analytical examples.

■ **PACKAGE CONTENTS**
A sturdy three ring binder
Over 70 pages of instruction and documentation
2 mini diskettes with the programs on one disk and the Econdata File on the other

■ **HARDWARE REQUIREMENTS**
TRS-80® with at least 48 K of RAM for Mod I&III, 64 K of RAM for Mod II
One disk (two are preferred)
TRSDOS®

To order, check software desired:

☐ Business Planning & Forecasting	Model I&III 199.00	Model II 299.00
☐ Box-Jenkins Forecasting	Model I&III 199.00	Model II 299.00
☐ United States Simulation Model	Model I&III 299.00	Model II 399.00
☐ Risk Analysis	Model I&III 149.00	Model II 249.00
☐ Econdata File	Model I&III 29.00	Model II 39.00

✓47

Applied Economic Analysis

Make check or money order payable to:
Applied Economic Analysis
P.O. Box 302, Allamuchy, NJ 07820
(201) 852-3573

10% Discount when ordering 2 or more programs of any mix.
New Jersey residents add 5% sales tax.
Shipping and handling prepaid in the U.S.
For overseas airmail delivery, add $19.00 shipping charges.

Name (print) _____ Title _____
Company _____ Address _____
City _____ State _____ Zip _____ Tele. No. _____

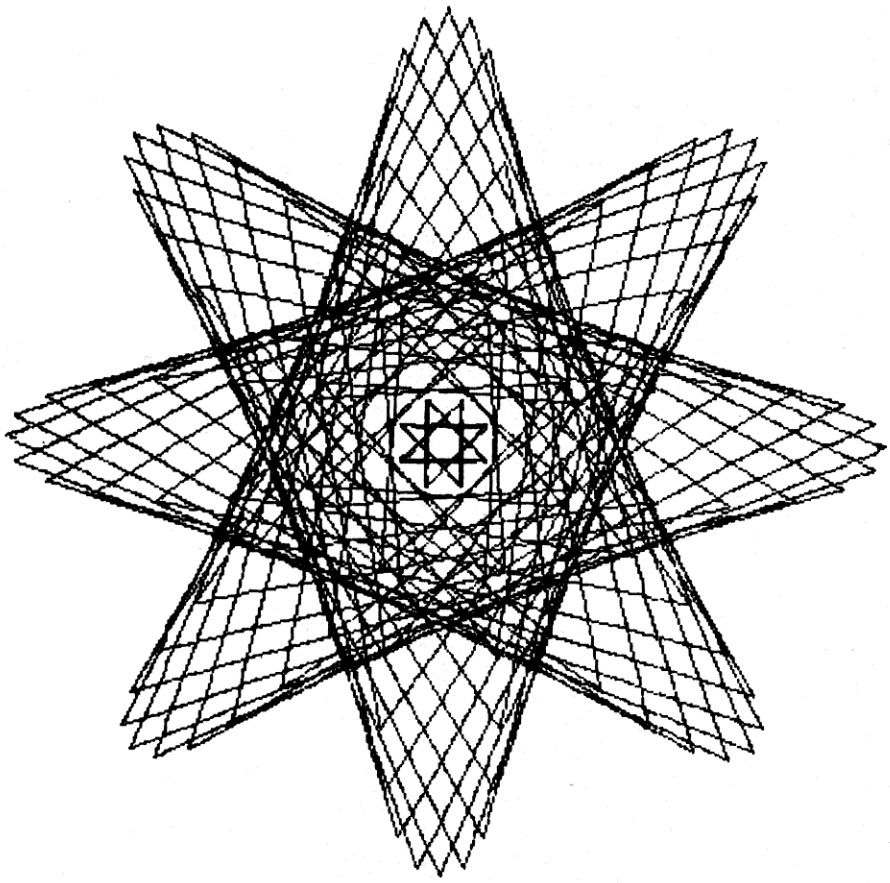


Figure 9: This is based on an eight leaf rose; the small star in the center was an accident.

```
100 REM  DESIGN NO. 9
110 FORT=0TO2*PI STEP PI/60
120 R=COS(4*T)*200
130 X1=COS(T)*R+202:Y1=SIN(T)*R+202
140 A=T+PI/4
150 R2=COS(4*A)*200
160 X2=COS(A)*R2+202:Y2=SIN(A)*R2+202
170 GOSUB 1500
180 NEXT T
```

curves as well as straight lines, as long as you begin with two sets of lines, such as the set from each of the circles in the example. These lines should be nearly parallel at some point.

Fig. 4 was one of my great failures. It was first done with a simpler program, but I forgot to save the program and had to write a longer one to reproduce it. My original intention was to produce a square spiral in which the distance between the lines increased as the length of the sides grew longer. I ended up with this design which I call "The Tunnel". This design sounds very odd when it is printing because of the regular spacing of the vertical lines.

Fig. 5 is a very simple, attractive, disk. It was created by taking 100 regularly spaced point on a circle and connecting them with points 3/4 π further around the cir-

FREE CATALOGUE WITH EVERY ORDER!

SCRIPMOD

By TERRY FIVEASH

Scripmod Features

- Allows you to use all those neat things your printer does from Scripsit!
- For use with any smart printer.
- Does not require special drives for your printer.
- Use with LP IV, DW II, IDS 440, IDS 460, NEC, DIABLO, QUME, and more!

UNDERLINING, SUPERSCRIPT, SUBSCRIP, BOLD TYPE, PITCHES.

YOU CAN EVEN UNDERLINE SPACES!

This Program is a must for every Scripsit user.

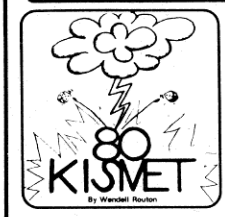
Scripmod is supplied on disc with full documentation.

$39.95

Print Central

A utility for those with smart printers. To send a control code to your printer, simply press the clean key and the appropriate letter key and see instant execution. Any code from 1 to 31 may be sent.

MODEL I — $24.95



80 KISMET
By Wendell Routon
Super version of this old game for your Model I or Model III TRS-80. Graphics, 16K Level II Minimum.
$14.95

THE BLACK BOX
By Ken Hayes
Shoot rays through black box, in search of hidden stars. Watch out! They're not always where they seem. Model I or III, 16K Level II Minimun. $14.95

BLACK BOX

THE TEMPLE OF RAH
By Dan Case
Rescue the fair princess from the clutches of the people of Rah before it's too late! Super adventure with **sound!** For Model I or III, 16K Level II minimun. $14.95

VIDEO SCREEN FILTER
Hard acrylic plastic screen that's easy to install—easy on your eyes.
GS 1 - Model I $14.95
GS 2 - Model II, III . $14.95
GS 3 - Leedex 100 . . $14.95
Special Size $16.95

VISA — MASTERCARD
Add 3%

Oklahoma Residents add 2% tax.

C.O.D.'s WELCOME!

Case COMPUTER PRODUCTS CO
414 South Oak
Sapulpa, Okla. 74066
[918] 224-9588

✓38

SPECIALSPECIAL**
TRS-80 ADD ON DRIVES
IMMEDIATE DELIVERY

SINGLE SIDED $225.00
DOUBLE SIDED $345.00

COMPLETE SYSTEMS
SINGLE SIDED $365.00
DOUBLE SIDED $485.00
INCLUDES:
MINI DISK DRIVE
FUSED POWER SUPPLY
VENTED CABINET
CABLE
90 DAY WARRANTY
FACTORY ASSEMBLED
FACTORY TESTED

THESE ARE NEW 5" FD's

I2 INTERFACE, INC ✓246
20932 CANTARA ST
CANOGA PARK, CA 91304
(213) 341-7914
VISA AND MASTER CHARGE ACCEPTED

MACHINE LANGUAGE PROGRAMS "BUGGING" YOU??

Debug them -- with C-ALL!!

- GENERAL OPERATION MODE
  machine language tape I/O, user memory and CPU register control, I/O port control, memory operations like fill, block move, and search
- DISASSEMBLY MODE
  dump to screen or screen and printer the assembly language mneumonics for instructions or data of a known format. Includes page formatting and breakpoint control.
- TRACE MODE
  large number of options: default displays four lines of CPU data, trace address, hex code and assembly language mneumonic prior to execution. Delay is 1 second or 1/16 second with shift pressed. Top of CRT displays CPU register and memory data; bottom displays last 7 instructions executed. Optional dump to printer.

C-ALL: JUST $19.95
(Level II or DOS, 32K recommended)

THE ALTERNATIVE SOURCE ✓138
1806 Ada Street
Lansing, MI 48910
517-487-3358
517-485-0344

Add: $2.00/postage, $1.50/COD, 4%/Visa.

"(This figure) is entirely made of equilateral triangles. The spiral shape comes from an Archimedes Spiral which is computed in line 120."

cle. By changing the number in line 130, the size of the internal circle can be controlled.

The remainder of the designs, including Fig. 5, all use mathematical formulae of

```
100 REM  DESIGN NO. 10
110 FORT=0TO2*PI STEP PI/30
120 R=T*31
130 X1=COS(T)*R+202:Y1=SIN(T)*R+202
140 A=T+2*PI/3
150 X2=COS(A)*R+202:Y2=SIN(A)*R+202
160 GOSUB 1500
170 B=T+4*PI/3
180 X1=COS(B)*R+202:Y1=SIN(B)*R+202
190 GOSUB 1500
200 X2=COS(T)*R+202:Y2=SIN(T)*R+202
210 GOSUB 1500
220 NEXT T
```

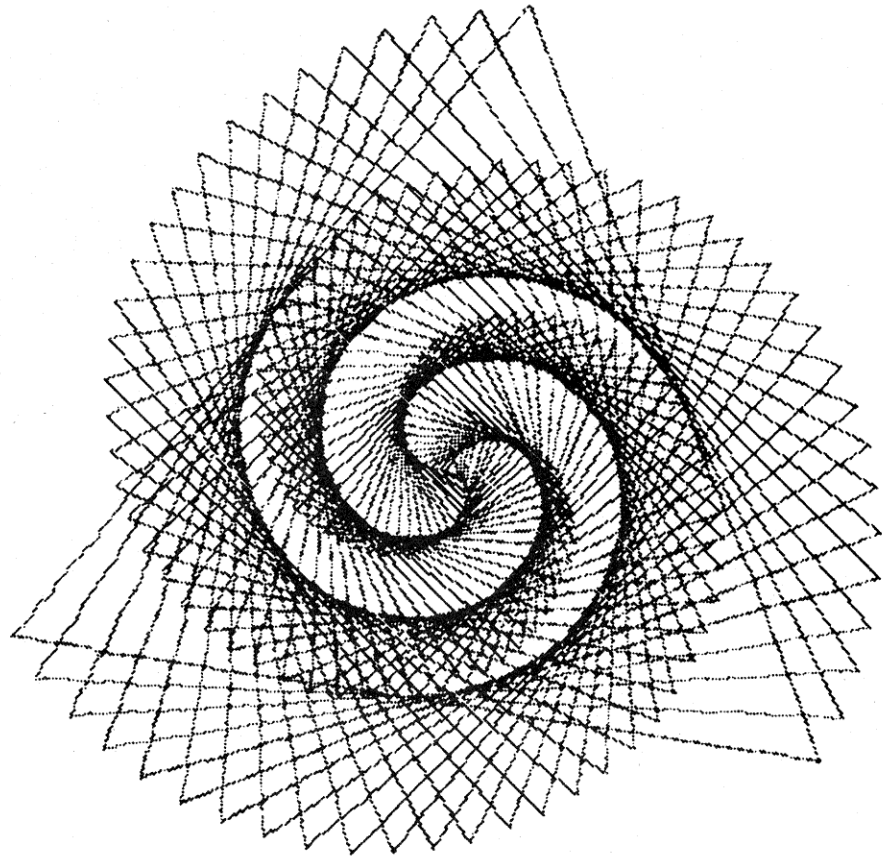


Figure 10: This is completely made of triangles.

Most people just sell disks. I sell you a complete system, and then I help you make it work.

It's called support, and it's a rare commodity in the microcomputer world.

It's also one big reason why they call my programs "the standard of the industry."

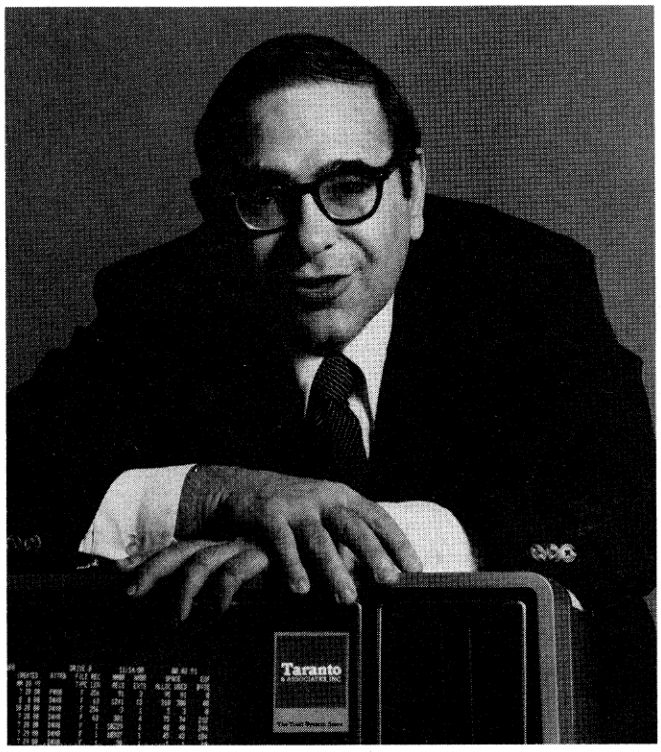
I'm Irwin Taranto, the one who changed the TRS-80* into a serious business computer. When you buy my TRS-80 systems (or, for that matter, one of my own computers that says "Taranto" on it), you buy me.

You buy my experience in making TRS-80 systems work in thousands of businesses around the world.

You buy the corrections, modifications and upgrades I constantly make on my TRS-80 systems.

And you buy my telephone number. You see, most of those thousand businesses needed a little help getting their systems up and going, and they called. We answered all their questions, and talked them through their problems. Every time the questions got really tough or really unusual, I'd answer them myself, on the phone, right then and there. I still do.

That pays off in two ways. It makes sure you get your systems working. It also alerts me to any little operating inefficiencies I might have designed into my systems. If there are any general business programs anywhere in the world, of any kind, that are checked out any better than my TRS-80 systems, I'd like to know about them.



I turned the TRS-80 into a serious computer.

The Model I, II and III business systems.

So far, I have six systems for the Model I, at $99 each:

Accounts Payable	General Ledger
Accounts Receivable	Payroll
Invoicing	Inventory Control

For the Cash Journal option on the General Ledger, add $50.

I also have six systems for the Model II:

General Ledger/Cash Journal	$ 299
Accounts Payable/Purchase Order	349
Open Accounts Receivable/Invoicing	349
Additional for Sales Analysis	100
Balance Forward Accounts Receivable	399
Payroll, without Job Costing	299
Additional for Job Costing	100
Inventory Control	399

For the Model III, we offer expanded versions of the six Model I systems, at $199 each.

Just call the number below and I'll send you any or all of the Model I or Model III systems by return mail. If you call about the Model II, I send you a questionnaire before I'll send you any systems. That lets me individualize the programs to your specific applications.

Why I call them "systems," not "programs."

There's a one-word answer: interaction. Each of the three sets of programs links to the General Ledger, and wherever it's useful, they cross-link to each other. For instance, "Sales Analysis" figures in a salesman's commission rate, so it links to "Payroll." Since it computes profitability within product categories, it links to "Invoicing."

That's what a system is. And that's one big difference between the Taranto TRS-80 business systems and somebody else's collection of business program disks.

If you like, I'll sell you the hardware, too.

I offer the TRS-80, Model II, along with selected peripherals. If you buy the computer from me, you get some extra advantages — hardware that's absolutely tailored to the programs, plus even more hand-holding from Taranto & Associates. The equipment won't cost you any more.

I can sell you a truly serious, completely supported, thoroughly proven business computer system for as little as $8000, hardware and software both.

There's nothing else like it in the market. Believe me, it's a far cry from that collection of program disks they're selling down the street.

✓45

Taranto
& ASSOCIATES, INC.

The Total System Store™

121 Paul Drive, San Rafael CA 94903.
Outside California, toll free (800) 227-2868. In California, (415) 472-2670.
Authorized dealers throughout America.

*A trademark of the Tandy Corporation

✓See List of Advertisers on page 306

common polar coordinate shapes. Fig. 5 uses the conversion formulae from polar coordinates to Cartesian coordinates. The formulae are: X = Rcos(T), Y = Rsin(T). In Fig. 5, the radius, R, is 200. The design in polar coordinates would have its center at the pole or the origin in Cartesian coordinates. Just as the center of the video screen is not (0,0) but (63,23), the center of the design is (202,202). To translate the center from (0,0) to (202,202), 202 must be added to the conversion formulae. These formulae are now: X = 200*cos(T) + 202, Y = 200* sin(T) + 202.

Fig. 6 is an example of an Archimedes spiral. The formula in polar coordinates is simply R = T. R = 5T produces an identically shaped spiral, which widens more rapidly. Line 110 provides angles for five revolutions with forty points on each revolution. Line 120 puts the (X1,Y1) point on the spiral, and lines 130 and 140 put the (X2,Y2) point one-third of a revolution further around the spiral.

An unlimited number of spirals can be created by using different numbers in this program. One of my favorite designs is made up of points on one spiral connected to equivalent points on another spiral which rotates in the opposite direction. (The best way to create patterns is by trial and error. From more than a hundred different designs, these eleven are the best).

Fig. 7 was another accident. I really didn't know what I would get with this program. This design uses a shape known as the four leaf rose. Its formula in polar coordinates is R = cos(2T). An endless set of roses with different numbers of petals can be created by changing the number two in the equation. If the equation were R = cos(3T), a three leaf rose would be produced. R = cos(4T) will produce an eight leaf rose.

A very small change in a program using polar coordinates can cause a major change in the design. The only differences between Fig. 7 and Fig. 5 are a different step in line 110 and a different offset in line 140. Fig. 8 is another of my favorites because it is completely made up of squares. It was another accident.

Fig. 9 is also very similar to Fig. 8, using an eight leaf rose rather than the four leaf rose. This is the fourth of four accidents. The small center star makes this design an amazing design instead just average.

The relationship between the step in line 110 and the offset in line 140 determines whether the ends of lines will meet. In Fig. 9,

Continue to 142

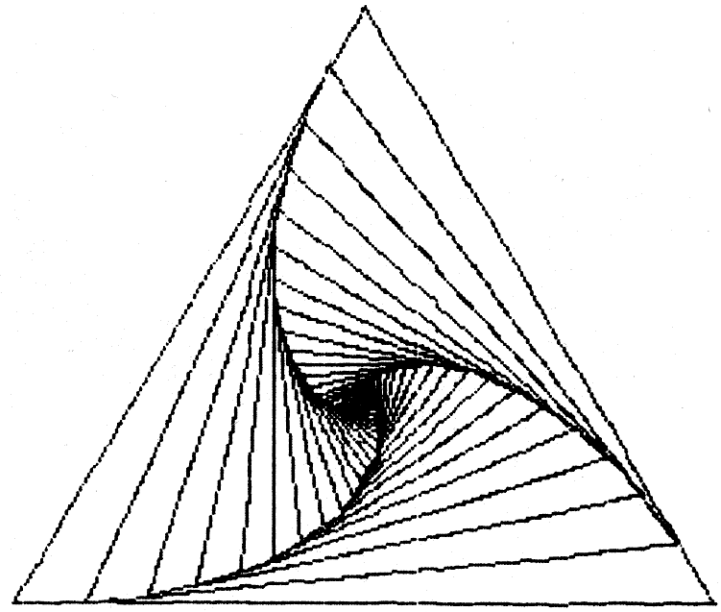


Figure 11: This design is made of triangles.

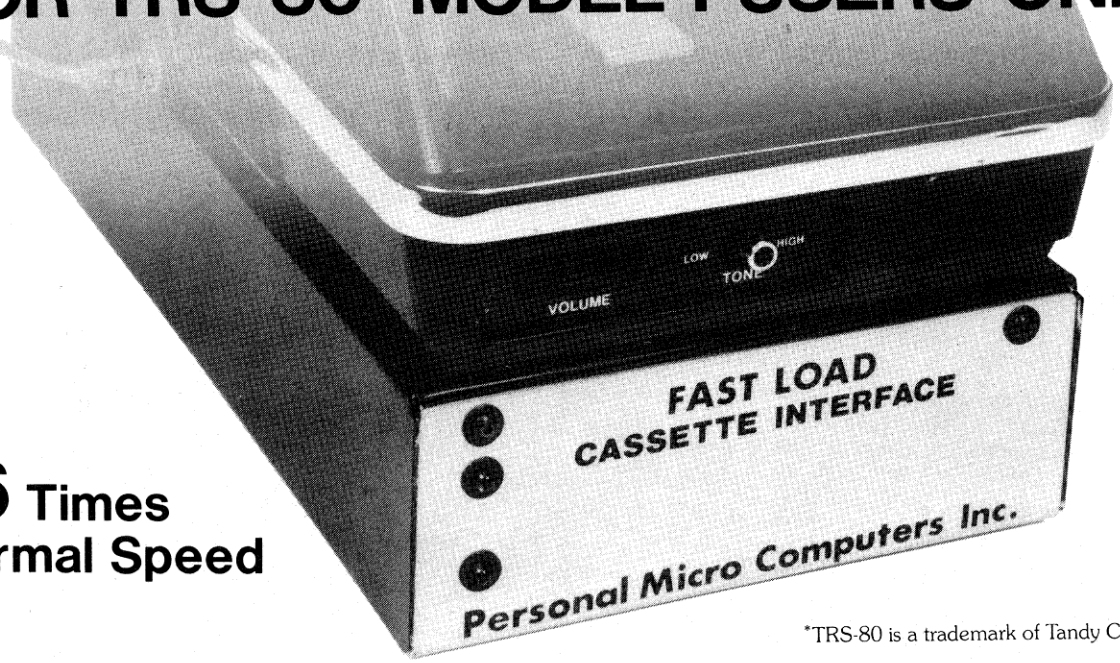
```
100 REM  DESIGN NO. 11
105 R=1
110 FORT=0TO3.24 STEP PI/30  :REM MAKES 32 TRIANGLES
120 R=R*1.17557
130 X1=COS(T)*R+202:Y1=SIN(T)*R+202
140 A=T+2*PI/3
150 X2=COS(A)*R+202:Y2=SIN(A)*R+202
160 GOSUB 1500
170 B=T+4*PI/3
180 X1=COS(B)*R+202:Y1=SIN(B)*R+202
190 GOSUB 1500
200 X2=COS(T)*R+202:Y2=SIN(T)*R+202
210 GOSUB 1500
220 NEXT T
```

Program Listing 1. BASIC Error Checking Routine

```
10 REM  PROGRAM NO. 1    BASIC ERROR CHECKING AND CALLI
     NG
20 OPEN
30 PI=3.1416
100 REM  DESIGN NO. 1
110 INPUT"NUMBER OF POINTS (SAMPLE HAS 18) ";N
120 DIM A(N),B(N)
130 FORT=0TO2*PI-.001 STEP 2*PI/N
140 Z=Z+1
150 A(Z)=COS(T)*200+202:B(Z)=SIN(T)*200+202
160 NEXT T
```

Fastload

FOR TRS-80* MODEL I USERS ONLY



16 Times Normal Speed

*TRS-80 is a trademark of Tandy Corp.

- **High speed load TRS-80* Level II cassettes**
- **Input 15K byte Level II program in 15 seconds**
- **Search BASIC or SYSTEM programs by name**

Unlike other high speed tape input devices, FASTLOAD uses standard format cassettes. Therefore, there is no need to re-record on other media. At 8000 baud, FASTLOAD is faster than disk for short programs. FASTLOAD reads tapes at the fast-forward speed of the CTR-41 cassette recorder. The recorder can also be used for CSAVE at the normal speed.

FASTLOAD connects to the 40 pin I/O or to the Expansion box. The control program does not use computer memory because it is in a built-in PROM. Other valuable features are keyboard debounce program, automatic key repeat routine and key-beep via cassette speaker. Price is $188.00 for FASTLOAD and $95.00 for the modified CTR-41 recorder.

✓422

Personal Micro Computers Inc.

475 Ellis Street, Mountain View, CA 94043 (415) 968-1604

✓See List of Advertisers on page 306

Throw It Away

(your dictionary, that is)

Now you can proofread and correct ten pages of text in less than one minute, with **MICROPROOF** dictionary software

- **EASY TO USE:** Prepare your text on any Z-80 based microcomputer, using any of a number of popular word processing programs. When you are finished, enter the appropriate command, and MICROPROOF proofreads your document, displaying misspellings and typos on the screen. Then MICROPROOF displays each error separately, requesting you to enter the correct spelling for each. Finally, MICROPROOF corrects your document. All in less than a minute.
- **COMPREHENSIVE:** MICROPROOF comes with a 50,000 word vocabulary. That's equivalent to a Webster's Pocket Dictionary. And MICROPROOF's dictionary is INFINITELY EXPANDABLE. You can add your own technical words and jargon.
- **RECOGNIZES** prefixes, suffixes, hyphenation and comment lines.
- **REQUIRES** ONLY 32K of memory and one single or double density 5¼ inch or 8 inch disk drive.
- **AFFORDABLE:** Available in three forms: fully independent program to identify errors, independent program to identify and correct errors, or with a conversion program that will permit MICROPROOF to operate from within your own word processing software.

PRICES

TRS-80® Model I version	$125.00	Correcting Feature	$60.00
TRS-80® Model II version	$200.00	Word Processing Conversion	
CP/M® version	$200.00	**Scripsit® or Electric Pencil®**	$35.00
APPLE® version	available soon	Separate User's Manual	$5.00

Master Charge and Visa accepted. No COD please. California residents add 6% sales tax.
Send for a brochure—specify type of microcomputer and word processing software used. Dealer inquiries welcome.

CORNUCOPIA SOFTWARE ✓378
Post Office Box 5028
Walnut Creek, California 94596
(415) 524-8098

"An unlimited number of spirals can be created by using different numbers in this program."

```
170 FORS=1TON-1:FORD=S+1TON
180 X1=A(S):Y1=B(S)
190 X2=A(D):Y2=B(D)
270 GOSUB1500
280 NEXT D,S
1000 INPUT"CONTINUE";A
1010 CLOSE
1020 END
1500 REM LINE ROUTINE
1510 PRINT"<";
1520 IF X1 < 0 OR X1 > 405 THEN PRINT"X1 ILLEGAL":END
1530 IF X2 < 0 OR X2 > 405 THEN PRINT"X2 ILLEGAL":END
1540 IF Y1 < 0 OR Y1 > 405 THEN PRINT"Y1 ILLEGAL":END
1550 IF Y2 < 0 OR Y2 > 405 THEN PRINT"Y2 ILLEGAL":END
1560 IF INT(X1)=INT(X2) AND INT(Y1)=INT(Y2) THENPRINT"V
     ALUE TOO CLOSE":RETURN
1600 X3=INT(X1/256):X4=INT(X2/256)
1610 Y3=INT(Y1/256):Y4=INT(Y2/256)
1620 POKE25241,X1-X3*256:POKE25242,X3
1630 POKE25245,Y1-Y3*256:POKE25246,Y3
1640 POKE25249,X2-X4*256:POKE25250,X4
1650 POKE25253,Y2-Y4*256:POKE25254,Y4
1660 LINE
1670 PRINT"> ";
1680 RETURN
```

Program Listing 2. Line Drawing Routine

```
                00100 ;LINE DRAWING ROUTINE FOR BASE 2 PRINTER AND 32K LEVEL II
                00110 ;BOB BOOTHE 7-8-80
41A3            00120          ORG     16804-1          ;LINE LOCATION
41A3 C3AF62     00130          JP      LINE             ; AUTOMATICALLY ENABLE
4179            00140          ORG     16762-1
4179 C39563     00150          JP      OPEN
4185            00160          ORG     16774-1
4185 C3B063     00170          JP      CLOSE
6297            00180          ORG     25239            ;SO END IS BELOW 25603
6297 0000       00190 STARTX   DEFW    0        ;RESERVE 4 BYTES FOR EACH VARIABLE
6299 0000       00200          DEFW    0
629B 0000       00210 STARTY   DEFW    0
629D 0000       00220          DEFW    0
629F 0000       00230 ENDX     DEFW    0
62A1 0000       00240          DEFW    0
62A3 0000       00250 ENDY     DEFW    0
62A5 0000       00260          DEFW    0
62A7 0000       00270 DIRX     DEFW    0         ;LEAST SIGNIFICANT
62A9 0000       00280          DEFW    0         ;MOST SIGNIFICANT
62AB 0000       00290 DIRY     DEFW    0
62AD 0000       00300          DEFW    0
62AF D9         00310 LINE     EXX                      ; SAVE REGISTERS
62B0 2AA162     00320          LD      HL,(ENDX+2)      ; GET END OF X POINT
62B3 ED5B9962   00330          LD      DE,(STARTX+2)    ; START OF X
62B7 B7         00340          OR      A                ; RESET CARRY FLAG
62B8 ED52       00350          SBC     HL,DE            ; FIND DIFFERENCE
62BA 22A762     00360          LD      (DIRX),HL
62BD CB7C       00370          BIT     7,H              ; IS THE RESULT NEGATIVE
62BF 2805       00380          JR      Z,DX0
62C1 21FFFF     00390          LD      HL,-1            ; YES, THEN MAKE MSW NEG
62C4 1803       00400          JR      PDX
62C6 210000     00410 DX0      LD      HL,0             ; NO, MAKE MSW 0
62C9 22A962     00420 PDX      LD      (DIRX+2),HL
62CC 2AA562     00430          LD      HL,(ENDY+2)      ; REPEAT ABOVE FOR Y
62CF ED5B9D62   00440          LD      DE,(STARTY+2)
62D3 B7         00450          OR      A
62D4 ED52       00460          SBC     HL,DE
62D6 22AB62     00470          LD      (DIRY),HL
62D9 CB7C       00480          BIT     7,H
62DB 2805       00490          JR      Z,DY0
62DD 21FFFF     00500          LD      HL,-1
62E0 1803       00510          JR      PDY
62E2 210000     00520 DY0      LD      HL,0
62E5 22AD62     00530 PDY      LD      (DIRY+2),HL
62E8 2AA762     00540          LD      HL,(DIRX)
62EB ED5BAB62   00550          LD      DE,(DIRY)
62EF 7C         00560          LD      A,H
62F0 E680       00570          AND     80H              ; PUT BIT 7 OF H IN B
```


DISK BASED WORD PROCESSOR 7.50

A complete word processing system for your TRS-80.
Provides full editing capability including paragraph move, line deletion, insertion and correction.
Store text on disk, print business/personal letters, reports with numbered pages and title pages.
Text is stored on disk as blocks are created so texts are not limited by the available memory.
Requires 16K and one or more disk drives.
Comes complete on cassette with software to produce upper/lower case at printhead, and keyboard reverse.
Full right/left justification and much more.
Send cheque, money order or order by phone, 24 hours, 7 days a week. Mastercharge and Visa cards welcome.
Please include $1.00 extra for first class post.

MAILING LIST OPTION 7.50

AVAILABLE NOW!

A complete mailing list option for the owners of the Pensa-Write Word Processor.
Capacity for 300 names per disk.
Sorts by postal code, prints business letters (created by Pensa-Write) against mailing list or portion thereof depending on selectable criteria.
Prints labels in user definable format: Any number of columns (up to 5) across the page, any tab postions, and any number of spaces between rows.
Interfaces directly with Pensa-Write Software to form the complete word processing/mailing system.
Requires 32K and one disk drive.
Please note: Pensa-Mail is not a "stand alone" program and is designed to be used with Pensa-Write.

Both systems available on Diskette for $19.95

PENSADYNE ✓207

MasterCard VISA

4441 WEST FIRST AVE.
VANCOUVER, B.C., V6R 4H9
604-224-3107

Little Bee EDUCATIONAL PROGRAMS

For TRS* 80 Level II 16 K CASSETTE

Upper/Lower Case Matching K-1
Provides a drill to associate upper case letters to corresponding lower case letters. $9.95

ABC sequence K-1
Marching letters reinforce alphabet sequence. $9.95

Listen and Spell (Wh-Th Words) 2-4
Provides drill for troublesome Wh-Th words. $9.95

Calendar Tic-Tac-Toe 2-4
Provides drill on sequence of months and days including current day and month for one or two students. $14.95

Math Facts K-6
Teacher selectable drill for math facts. Teacher selects +, −, ×, ÷ and limits. $9.95

Contractions 2-4
Drill for students to provide the two words that make up contraction $9.95

Self correcting and scoring, positive reinforcement

*Trademark of Tandy Corp.

Little Bee EDUCATIONAL PROGRAMS ✓208
P.O. Box 262 Massillon, Ohio 44646

✓See List of Advertisers on page 306

DOES YOUR SMART PRINTER SUDDENLY BECOME DUMB WHEN YOU PRINT FROM SCRIPSIT?

Is your printer capable of underlining but not from Scripsit?

Is your printer capable of **Bold Printing** but not from Scripsit?

Can your printer super script and sub script but not from Scripsit?

Can your printer change pitches but not from Scripsit?

The answer is SCRIPMOD

SCRIPMOD does not require a separate printer driver. With SCRIPMOD control codes can be embedded in the test of your document. You use the same format line syntax you're used to now. SCRIPMOD adds one format instruction to Scripsit & two control codes.

>C=N J=N **CC=H**

The above line tells SCRIPMOD to justify text and to backspace the printer upon encountering a Text Character in the document. The Text Character is entered by placing the cursor at the place in text where the control code is to take place and typing on **@T**. Of course your printer must be capable of backspacing and must use the ASCII code 8 (or H) as the control for backspace. If the code is something different there is no problem as the correct code may always be sent. Any control code your printer is capable of using from 1 to 31 with or without an **ESCAPE** lead in many be sent.

The second control code which is added in the **MENU** command. You press an **@M** and the screen clears and prompts you to select a drive from 0 through 3 or return to the text. All visible files can be displayed on the screen at this time. When you select to return to the text, the cursor is placed on the exact character it was on when you selected **@M**.

The minimum system required for SCRIPMOD is the Mod I 32K disk system with either the RS lower case mod or the EP lower case mod.

SCRIPMOD is supplied on disk with full documentation for **$39.95.**

PENCIL-FIX Save your warranty. Use PENCIL-FIX to avoid custom control key on your keyboard. Redefines the control key for EP to be the @ key. Use RS lower case mod or the EP mod without the control key. Disk based EP only . . . **$14.95**

PRINT-CENTRAL Send any control code directly to your smart printer from the BASIC command mode or from DOS. Avoid having to type such things as "LPRINT CHR$(31) just to change pitch. Use CLEAR right arrow (two key strokes) instead. Any code from 1 to 31 may be sent. Mod I 32K disk . . . **$24.95**

SPOOL-REL An in-memory print buffer that runs in Mod I 32K or 48K disk systems. Fully relocatable code and buffer. A true background spooler at an unbelievably low price . . . **$24.95**

TIGGER-GRAF Create engineering, scientific, business, or just plain fun on your IDS 440G or 460G printer. Resolution is 495 x 575. Easy BASIC programs provided for data entry and machine language module for speed. Includes setting individual points, drawing lines, shading shapes. Several graphs may be catenated along the Y-axis for larger graphs. Requires Mod I 32 or 48K 1 disk . . . **$149.95**

VERN STREET PRODUCTS ✓111

THE COMPUTER STORE 4949 S. Peoria • Tulsa, OK 74105 • 918-747-2550

ACCEL/ACCEL2 SPEEDUPS

TRS-80 Model I BASIC Compilers

Table below shows the BASIC subset translated by **ACCEL** and **ACCEL2** to machine code. Figures represent the minimum expected ratio of execution times, compiler to interpreter. All other BASIC statements and functions run at interpreter speed after compilation.

	INTEGER	SINGLE	DOUBLE	STRING
Assignment (LET)	**115**	3.3	3.4	7.6
Array Reference (1-dim)	35	78	66	34.5
AND or OR	**41**	2.5	2.0	
Compare (<,etc)	**30**	1.6	1.4	4.2
Add, Subtract, Concat	**47**	2.0	1.5	4.9
Multiply (*)	3.3	2.0	1.5	
Divide (/)	2.0	2.0	1.02	
Reference to a constant	**69**	65	54	2.1
FOR with NEXT	**15**			
POKE	**82**	4.6	3.6	
SET or RESET	**6.7**	3.1	2.6	
IF THEN ELSE	**11.1**	3.0	2.3	7.6
ON expression GOTO	**15.8**	3.2	2.8	
Functions				
VARPTR	**33**	47	47	44
USR	**11.2**	3.7	2.8	
POINT	**6.9**	3.0	2.5	
PEEK	**52**	4.4	3.5	
LEN				43
MID$				4.1
LEFT$				3.0
RIGHT$				2.8
CHR$				4.7
ASC				30
CVI				28
Flow of Control				
GOSUB with RETURN	**137**			
GOTO	**204**			
All other BASIC statements and functions	**1.0**	**1.0**	**1.0**	**1.0**

ACCEL: For 16K TRS-80 Model I. Compiles boldface subset in INTEGER variable type. Compile-time size 2816 bytes, run-time size 256 bytes. Trade up later to ACCEL2 for the price difference. $44.95 + .75 shipping

ACCEL2: For 32K TRS-80 Model I. Compiles subset in all variable types. Compile-time size 5120 bytes, run-time size 1024 bytes. Local and Global options help control growth of the compiled code. Output save to Disk, Stringy/Floppy. TRSDOS and most vendor DOSs supported. Use ACCEL2 during BASIC program development for easy huge speedups. $88.95 + 1.50 shipping

TSAVE: Writes ACCEL/ACCEL2 compiler output to independent SYSTEM tape. $9.95

Developed in Britain by Southern Software

ALLEN GELDER SOFTWARE ✓79
Box 11721 Main Post Office
San Francisco, CA 94101

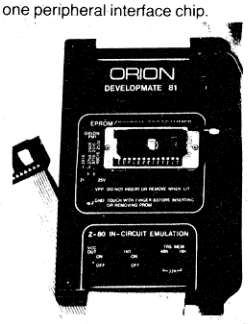
Mastercharge/Visa
Ca add 6%

TRS-80, TRSDOS tm Radio Shack
Stringy/Floppy tm exatron, inc.

CONVERT YOUR TRS-80 MODEL-I INTO A DEVELOPMENT SYSTEM

Now you can develop Z-80 based, *stand-alone* devices such as games, robots, instruments and peripheral controllers, by using your TRS-80 as a development system. The DEVELOPMATE plugs into the expansion connector of your TRS-80 and adds **PROM PROGRAMMING** and **IN-CIRCUIT-EMULATION** capabilities to your system (with or without expansion interface).

Complete instructions and sample schematics are included to help you design your own simple stand-alone microcomputer systems. THESE SYSTEMS CAN BE AS SIMPLE AS FOUR ICs: one TTL circuit for clock and reset, a Z-80, an EPROM, and one peripheral interface chip.



When the In-Circuit-Emulation cable is plugged into the Z-80 socket of your stand-alone system, the system becomes a part of your TRS-80: You can use the full power of your editor/assembler's debug and trace programs to check out both the *hardware and the software*. Simple test loops can be used to check out the hardware, then the system program can be run to debug the logic of your stand-alone device.

Since the program is kept in TRS-80 RAM, changes can be made quickly and easily. When your stand-alone device works as desired, you use the Developmate's PROM PROGRAMMER to copy the program into a PROM. With this PROM, and a Z-80 in place of the emulation cable, your stand-alone device will work by itself.

The DEVELOPMATE is extremely compact: Both the PROM programmer and the In-Circuit-Emulator are in one small plastic box only 3.2"×5.4". A line-plug mounted power supply is included. The PROM programmer has a "personality module" which defines the voltages and connections of the PROM so that future devices can be accommodated. However, the system comes with a "universal" personality module which handles 2758,2508(8K), 2716,2516(16K), 2532(32K), as well as the new electrically alterable 2816 and 48016(16K EEPROMs).

The COMPLETE DEVELOPMATE 81, with software, power supply, emulation cable, TRS-80 cable, and "universal" personality module, is ONLY $329!
The PROM PROGRAMMER is available *separately* for ONLY $239.

ORION INSTRUMENTS ✓376
172 Otis Avenue, Dept. M, Woodside, CA 94062
(415) 851-1172
Master Charge and Visa phone orders accepted.
California residents please add 6% sales tax.

```
62F2 47          00580          LD      B,A
62F3 7A          00590          LD      A,D
62F4 E680        00600          AND     80H              ; PUT BIT 7 OF D IN C
62F6 4F          00610          LD      C,A
62F7 CB25        00620 SHIFT    SLA     L                ; EXPAND DIRECTION UNTIL
62F9 CB14        00630          RL      H                ; BIT 7 CHANGES
62FB CB23        00640          SLA     E                ; THIS GIVES MAX. SPEED
62FD CB12        00650          RL      D
62FF 7C          00660          LD      A,H
6300 E680        00670          AND     80H
6302 B8          00680          CP      B
6303 2008        00690          JR      NZ,DSHIFT
6305 7A          00700          LD      A,D
6306 E680        00710          AND     80H
6308 B9          00720          CP      C
6309 2002        00730          JR      NZ,DSHIFT
630B 18EA        00740          JR      SHIFT
630D 22A762      00750 DSHIFT   LD      (DIRX),HL        ; DONE SHIFTING SO STORE
6310 ED53AB62    00760          LD      (DIRY),DE
6314 CD6163      00770 NXTBLO   CALL    SET              ; SET 1ST POINT
6317 AF          00780          XOR     A                ; RESET CARRY FLAG
6318 2AA162      00790          LD      HL,(ENDX+2)
631B ED5B9962    00800          LD      DE,(STARTX+2)
631F ED52        00810          SBC     HL,DE            ; DOES START = END YET
6321 2830        00820          JR      Z,MAYBE
6323 2A9762      00830 NOTYET   LD      HL,(STARTX)      ; ADD DIRECTION TO START
6326 ED5BA762    00840          LD      DE,(DIRX)
632A 19          00850          ADD     HL,DE            ; ADD LSW'S FIRST
632B 229762      00860          LD      (STARTX),HL
632E 2A9962      00870          LD      HL,(STARTX+2)
6331 ED5BA962    00880          LD      DE,(DIRX+2)      ; (DIRX+2) SHOULD BE 0
6335 ED5A        00890          ADC     HL,DE            ; ADD CARRY FROM LSW'S
6337 229962      00900          LD      (STARTX+2),HL    ; REPEAT FOR Y'S
633A 2A9B62      00910          LD      HL,(STARTY)
633D ED5BAB62    00920          LD      DE,(DIRY)
6341 19          00930          ADD     HL,DE
6342 229B62      00940          LD      (STARTY),HL
6345 2A9D62      00950          LD      HL,(STARTY+2)
6348 ED5BAD62    00960          LD      DE,(DIRY+2)
634C ED5A        00970          ADC     HL,DE
634E 229D62      00980          LD      (STARTY+2),HL
6351 18C1        00990          JR      NXTBLO
6353 B7          01000 MAYBE    OR      A                ; ARE Y'S ALSO EQUAL
6354 2AA562      01010          LD      HL,(ENDY+2)
6357 ED5B9D62    01020          LD      DE,(STARTY+2)
635B ED52        01030          SBC     HL,DE
635D 20C4        01040          JR      NZ,NOTYET        ; NO, GO BACK AND FINISH
635F D9          01050          EXX                      ; GET BACK OLD REGISTERS
6360 C9          01060          RET                      ; RETURN TO PROGRAM
6361 0600        01070 SET      LD      B,0              ; ROUTINE TO SET A POINT
6363 2A9D62      01080          LD      HL,(STARTY+2)
6366 110700      01090          LD      DE,7             ; GOING TO DIVIDE BY 7
6369 B7          01100          OR      A                ; RESET CARRY FLAG
636A ED52        01110 DIV7     SBC     HL,DE            ; DIVISION BY SUBTRATION
636C 3803        01120          JR      C,DONDIV
636E 04          01130          INC     B                ; COUNT THE 7'S
636F 18F9        01140          JR      DIV7
6371 19          01150 DONDIV   ADD     HL,DE            ; PUT BACK LAST 7
6372 4D          01160          LD      C,L              ; PUT REMAINDER IN C
6373 04          01170          INC     B                ; SO B ISN'T 0
6374 119601      01180          LD      DE,406           ; 406 BYTES PER LINE
6377 216D62      01190          LD      HL,25603-406     ; COMPENSATE FOR (INC B)
637A 19          01200 MULT     ADD     HL,DE            ; ADD 406 FOR EACH LINE
637B 10FD        01210          DJNZ    MULT
637D ED5B9962    01220          LD      DE,(STARTX+2)    ; GET X COLUMN
6381 19          01230          ADD     HL,DE            ; MAKE ADDRESS
6382 41          01240          LD      B,C
6383 04          01250          INC     B                ; SO B DOESN'T EQUAL 0
6384 118D63      01260          LD      DE,TABLE-1       ; COMPENSATE FOR (INC B)
6387 13          01270 FINDT    INC     DE
6388 10FD        01280          DJNZ    FINDT            ; FIND LOCATION IN TABLE
638A 1A          01290          LD      A,(DE)
638B B6          01300          OR      (HL)             ; SET THAT BIT
638C 77          01310          LD      (HL),A           ; STORE
638D C9          01320          RET                      ; FINALLY DONE
638E 01          01330 TABLE    DEFB    01H              ; BIT 0
638F 02          01340          DEFB    02H              ; BIT 1
6390 04          01350          DEFB    04H              ; SO ON
6391 08          01360          DEFB    08H
6392 10          01370          DEFB    10H
6393 20          01380          DEFB    20H
6394 40          01390          DEFB    40H
```

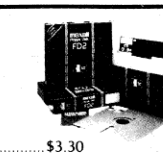

SPECTACULAR OFFERS

BASF "FLEXYDISK"...
Superior Quality data storage medium.
Certified and guaranteed 100% error free.

SINGLE SIDED-SINGLE DENSITY

5¼" or 8" Diskettes ..... 10/$24
5¼" or 8" Vinyl Storage Pages .....10/$5

MAXELL-DISKETTES
The best quality diskette money can buy.
Approved by Shugart and IBM.

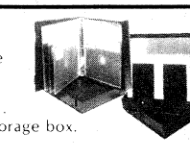


Sold only in boxes of 10

5" 1-side.....$3.30
8" 1-side.....$3.90
5" 2-side.....$4.25
8" 2-side.....$5.60

ALL MAXELL DISKETTES ARE DOUBLE DENSITY

LIBRARY CASE...
3-ring binder album.
Protects your valuable programs on disks
Fully enclosed and protected on all sides.
Similar to Kas-sette storage box.

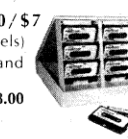


Library 3-Ring Binder $6.50
5¼" Mini Kas-sette/10 .....$2.49
8" Kas-sette/10.....$2.99

DISKETTE DRIVE HEAD CLEANING KITS
Prevent head crashes and insure efficient, error-free operation.

5¼" or 8".....$19.50

SFD CASSETTES
C-10 Cassettes.....10/$7
(All cassettes include box & labels)
Get 8 cassettes,C-10 sonic and Cassette/8 library album for only.....$8.00
(As illustrated)



HARDHOLE
Reinforcing ring of tough mylar protects disk from damage

8" Applicator $4 5¼" Applicator $3
50/8" Hardholes $8 5¼" Hardholes $6

VISA • MASTERCHARGE • MONEY ORDERS
CERTIFIED CHECK • FOR PERSONAL CHECKS
ALLOW TWO WEEKS • C.O.D. REQUIRES A 10% DEPOSIT • CAL. RES. ADD 6% SALES TAX
MIN $2 SHIPPING & HANDLING • MINIMUM ORDER $10 • SATISFACTION GUARANTEED OR FULL REFUND
Write for our free catalog

ABM PRODUCTS ✓56

631 B ST.
SAN DIEGO, CA 92101
(714)235-6602

"This design took more work than any other design because the numbers had to be precisely calculated. . ."

```
6395 D9        01400 OPEN     EXX                          ; SAVE REGISTERS
6396 210364    01410          LD      HL,25603             ; START PICTURE
6399 110464    01420          LD      DE,25604             ; START +1
639C 01FB5B    01430          LD      BC,23547             ; LENGTH
639F 3680      01440          LD      (HL),128             ; BIT 7 ON, REST OFF
63A1 EDB0      01450          LDIR                         ; COPY ALL THE WAY
63A3 D9        01460          EXX                          ; GIVE 'EM OLD REGISTERS
63A4 C9        01470          RET                          ; GET BACK TO FUN STUFF
63A5 E5        01480 PRTOUT   PUSH    HL                   ; SAVE HL
63A6 21E837    01490          LD      HL,37E8H             ; LP POINTER
63A9 CB7E      01500 PRTLP8   BIT     7,(HL)               ; BIT 7 ON MEANS BUSY
63AB 20FC      01510          JR      NZ,PRTLP8
63AD 77        01520          LD      (HL),A               ; LP READY, SO OUTPUT
63AE E1        01530          POP     HL                   ; GET BACK HL
63AF C9        01540          RET                          ; BACK TO WORK
63B0 D9        01550 CLOSE    EXX                          ; YOU KNOW WHAT THIS DOES
63B1 3E1B      01560          LD      A,27                 ; ESCAPE
63B3 CDA563    01570          CALL    PRTOUT
63B6 3E32      01580          LD      A,50                 ; 96 CHARACTERS PER LINE
63B8 CDA563    01590          CALL    PRTOUT
63BB 3E1B      01600          LD      A,27                 ; ESCAPE
63BD CDA563    01610          CALL    PRTOUT
63C0 3E62      01620          LD      A,98                 ; SET VERTICAL LINE
63C2 CDA563    01630          CALL    PRTOUT
63C5 3E0E      01640          LD      A,14                 ; SPACING TO 14 HALF DOTS
63C7 CDA563    01650          CALL    PRTOUT
63CA 063A      01660          LD      B,58                 ; NUMBER OF LINES
63CC 210364    01670          LD      HL,25603             ; FIRST BYTE LOCATION
63CF C5        01680 LOOP     PUSH    BC                   ; SAVE LINE COUNTER
63D0 3E1B      01690          LD      A,27                 ; ESCAPE
63D2 CDA563    01700          CALL    PRTOUT
63D5 3E63      01710          LD      A,99                 ; TRANSMIT GRAPHICAL DATA
63D7 CDA563    01720          CALL    PRTOUT
63DA 0655      01730          LD      B,85                 ;NUMBER OF BLANKS
63DC 3E80      01740 BLANK1   LD      A,128                ; IT IGNORES BIT 7
63DE CDA563    01750          CALL    PRTOUT
63E1 10F9      01760          DJNZ    BLANK1
63E3 019601    01770          LD      BC,406               ;NO. CHARS FROM MEMORY
63E6 7E        01780 CHAR     LD      A,(HL)
63E7 CDA563    01790          CALL    PRTOUT
63EA 23        01800          INC     HL                   ; INC ADDRESS AFTER EACH
63EB 0B        01810          DEC     BC                   ; DEC COUNTER AND CHECK
63EC 79        01820          LD      A,C
63ED B0        01830          OR      B
63EE 20F6      01840          JR      NZ,CHAR
63F0 0655      01850          LD      B,85                 ; MORE BLANKS AT END
63F2 3E80      01860 BLANK2   LD      A,128
63F4 CDA563    01870          CALL    PRTOUT
63F7 10F9      01880          DJNZ    BLANK2               ; THAT FINISHES ONE LINE
63F9 3E0D      01890          LD      A,13                 ; CAUSES LINE FEED
63FB CDA563    01900          CALL    PRTOUT
63FE C1        01910          POP     BC                   ; GET LINE COUNTER
63FF 10CE      01920          DJNZ    LOOP
6401 D9        01930          EXX
6402 C9        01940          RET     ;ADDRESS SHOULD BE 6402H WHEN ASSEMBLING
1A19           01950          END     1A19H                ;ENTRY TO LEVEL II BASIC
00000 TOTAL ERRORS
```

60/4 = 15. Because 15 is an integer, the ends will meet. However, in Fig. 5, 50*(3/4) = 37.5. Since 37.5 is not an integer, the ends will not meet.

Fig. 10 is made up entirely of equilateral triangles. The spiral shape comes from an Archimedes spiral which is computed in line 120. The first corner is computed in line 130, and the other corners are computed by adding an angle to it without changing the radius. All previous programs calculated a new radius whenever the angle was changed.

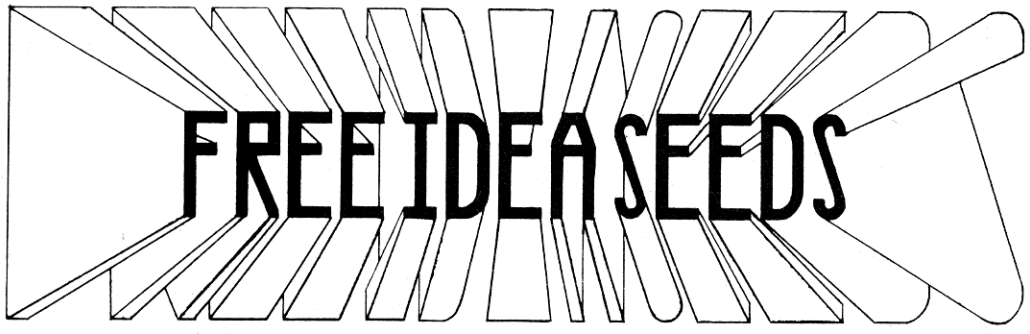
Fig. 11 is the same as Fig. 10 except that it is based on a logarithmic spiral instead of an Archimedes spiral. This design took more work than any other design because the numbers had to be precisely calculated so that each triangle would just touch but not overlap the previous one.

Some very good designs can be produced by combining several triangles. I have a more complicated program which draws six of these triangles together to form a fascinating hexagonal pattern.

A simple exercise in graphics is to make Fig. 1 in the shape of an elipse instead of a circle. A slightly more difficult problem is to make Fig. 10 rotate in the opposite direction. A very tricky problem is to make a design similar to Fig. 8 out of triangles or even hexagons. I will leave the rest to you, your imagination and luck. ■

Next month: the third dimension.

Bob Boothe is 18 years old and will graduate from Rolling Hills High School in June. He presently plans to enter the University of California at San Diego (the home of Pascal), in September, to major in Computer Science.



The most unique concept in software ideas. Are you tired of not knowing those tricks and shortcuts which the expert programmer utilizes without even thinking twice? Now you can pick up some tips and novel routines which will simplify your own BASIC programming. TRS-80 Model I LII.

TRS-80 is a trademark of Tandy Corp.

Free Idea Seeds is a trademark of CECDAT, INC.

All you have to do is send a No. 10 size envelope, self-addressed and stamped, to:

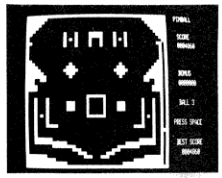
✓62

CECDAT, INC.
P. O. Box 8963
Moscow, ID 83843

ACORN ARCADE!

FOR TRS-80*

FAST, REAL-TIME ACTION WITH SOUND



PINBALL

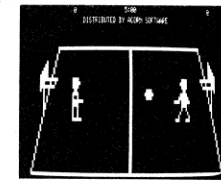
By John Allen

Get your flipper fingers ready for action in this real-time machine language game.

Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80.* Choose from five playing speeds to match your skill—but be prepared for a lot of practice if you ever hope to master the fastest speed.

Can you beat your friends' scores? Will you avoid the dreaded "Bermuda Square?" Get PINBALL today and find out. Available for $14.95 on tape or $20.95 on disk.

BASKETBALL



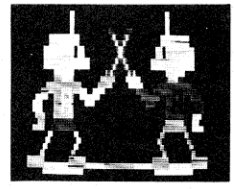
By John Allen

Fast machine language action game, with sound, from the author of the acclaimed "PINBALL"!

Try to keep up with the action and outscore your opponent in five minutes of one-on-one basketball. Steal the ball, duck around your opponent and slant toward the basket for a lay up! The graphics are based on a 3-dimensional depiction of a basketball court, and ball dribbling sounds add to the realism. Compete against a friend or your computer.

It's all there but the cheers—on tape for only $14.95, disk version for $20.95.

DUEL -N- DROIDS

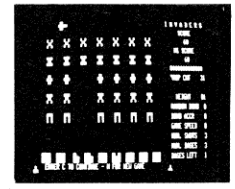


By Leo Christopherson

Your 'droid has already learned NIM, so now it's time to teach it how to wield a laser sword! For DUEL-N-DROIDS, a new type of animation and high-quality sound has been developed by Leo Christopherson, author of "Android NIM," "Dancing Demon" and other animations.

Your 'droid starts out as a lowly clown. You teach it how to use a laser sword by controlling its movements. After it attains the rank of "Grand Master," enter it in the tournament against the program. Entertainment for all ages!

Available for $14.95 on tape, $20.95 for disk.



INVADERS FROM SPACE

By Carl Miller

A new and faster machine language approach to this classic (and addictive) space game. As you play, the aliens drop bombs, move from side to side, and try to overrun your bases. All you have to do is shoot them down. It's easy—until they speed up their action!

You choose the speed, enemy bomb frequency and accuracy, and how many shots and bases you have. Unlike other games of this type, you can move your base and simultaneously fire at the invaders. Fun for all ages and skill levels, it has full sound effects for even more excitement.

Available for only $14.95 on tape or $20.95 on disk.

Available now from these and other fine Acorn dealers

AUTHORS & DEALERS WANTED

Acorn
Software Products, Inc.

634 North Carolina Avenue, S.E., Washington, D.C. 20003

✓34

ADVENTURE INTERNATIONAL
Box 3435
Longwood, FL 32750

COMPUTERLAND/CLEVELAND
1288 SOM Center Rd.
Mayfield Hts., OH 44124
and
4579 Great Northern Blvd.
Cleveland, OH 44070

DIGIBYTE COMPUTER CENTER
31 East 31st St.
New York, NY 10016

E.B. GARCIA & ASSOCIATES
203 North Wabash
Chicago, IL 60601

H & E COMPUTRONICS
50 North Pascack
Spring Valley, NY 10977

HOBBY WORLD ELECTRONICS
19511 Business Center Dr.
North Ridge, CA 91324

THE PROGRAM STORE
4200 Wisconsin Ave.
Washington, DC 20016
and
W. Bell Plaza
6600 Security Blvd.
Baltimore, MD 21207

*TRS-80 is a trademark of Tandy Corp.

MICROCOMPUTER TECHNOLOGY INCORPORATED

SPRING SALE

CLEARANCE SPECIAL
SHUGART SA400 (TF-3)

35 track disk drive includes power supply and chassis.

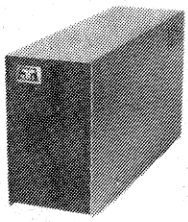
$299

LIMITED SUPPLY

FREE FULL YEAR WARRANTY

with purchase of new SHUGART SA400 (TF-3L) comes complete with power supply, chassis, cable & NEW DOS 80

ONLY **$439**



THE MICROCONDUCTOR™

the ultimate data base manager for your TRS-80®

The MICROCONDUCTOR™ is not just a file manager but a true Data Base Management System suitable for both the novice and professional users.

DATA FILES—No limit on the number of records a file can have.
FIELDS—Any type (string, interger, single, double). Eight entry modes (including defaults, counting, and suppress).
REPORTS—Four ways to generate reports. Total numeric column(s). Print on any paper in any format (statements, labels, etc.).
SORT—Any field(s) (i.e. multiple-key sort). Any size file, numeric or ASCII. Ascending or descending.
MAINT.—Command anticipation. Record duplication. Direct access and sequential search.
UPDATING/MERGING—Add, subtract, multiply, divide fields. Combine results from previous calculations. Test for any condition and take action.

TRS-80® MODEL I	$159
TRS-80® MODEL II	$399

NEW FOR TRS-80®

TF-8 80 TRACK DISK DRIVE by MPI

Double your capacity. Single head mini floppy. More than 200K bytes of storage. Complete with power supply and chassis.

$619

TF-9 DUAL 80 TRACK DISK DRIVE by MPI

Quadruple your capacity. 400K bytes of storage (like having 4-40 track drives in one unit). Complete with power supply and chassis.

$769

MOD II 8" Disk System

- 1 Drive System $949
- 2 Drive Expansion System $1,445

Disk Drive Sale!

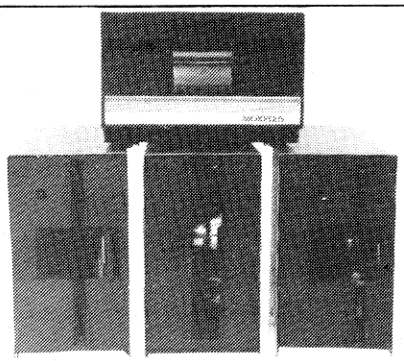
with **FREE** power supply and chassis.

Shugart SA400L, 40 trk.	$329
Pertec FD200, 40 trk.	$379
TF-5 MPI B51, 40 trk.	$349
TF-7 Mircopolis, 77 trk.	$559
TDH-1 Dual sided drive, 35 trk.	$449
TF-3M Drive sys. 2 Shugart 40 trk.	$649

SOFTWARE SALE

NEWDOS 80	$149		
NEWDOS+ 40 trk.	$110	30 trk.	$99
AJA Business Pkg.	$359		
The Source	$100	Basic Compiler	$195

MONTHLY SPECIAL
Shugart SA801 Bare Drive **$459**



MOD I Disk Expansion Systems

- 2 Shugart SA400 TF-3 ..... $658
- 1 Two-Drive Cable $26
- 1 Expansion Interface 32K $439
- 1 DOS+ $99

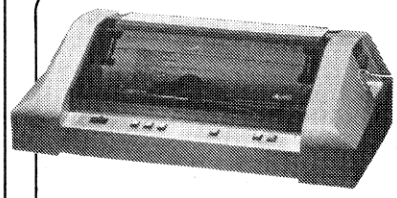
TOTAL LIST PRICE $1,222

SPECIAL PRICE ONLY **$1,077**

★ BARE DRIVES FOR ANY MICROCOMPUTER

Pertec FD200	$282	FD250	$359
Shugart SA400 35 track	$269	SA400L 40 track	$279
MPI B51	$279	B52	$349
MPI B91	$399	B92	$525

Memory Kit (16K)	$43.00
AC Isolator (6 socket)	$49.95
Disk Head Cleaner	$19.95
Diskettes Verbatim (10) hard ring	$30.00



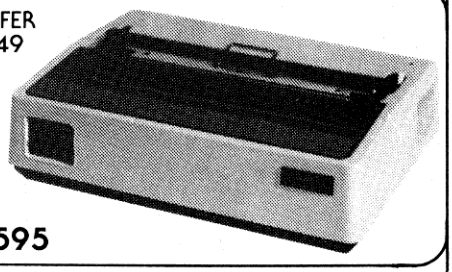
Anadex 9500 .... $1,449

Printers

Microline 82	$849
Microline 83	$1,060
Centronics 779	$1,069
Centronics 700	$1,129
Base 2	$649
Centronics 737	$839
Centronics 702-9	$1,995
Malibu	$2,093
Paper Tiger	$895
Daisy Wheel	$1,799

INTRODUCTORY OFFER
SAVE $300 LIST $949

Okidata Microline 80
$599



EPSON PRINTER $595

® Registered trademark of Radio Shack

TRS-80® MODEL III OWNERS

We think our disk system for expanding your capacity is just as good as theirs - and we know it costs much less . . .

COMPLETE SYSTEMS AND COMPONENTS*

TRS-80® MOD III SYSTEM

with 2 disk drives, 48K*

SAVE $500 OFF LIST PRICE

$1,899

16K RAM, Model III Basic $899

MTI DISK DRIVES for MOD III

Internal Kits

Disk Drive 1 ..... $649

Disk Drive 2 ..... $279

External Add-on Kits

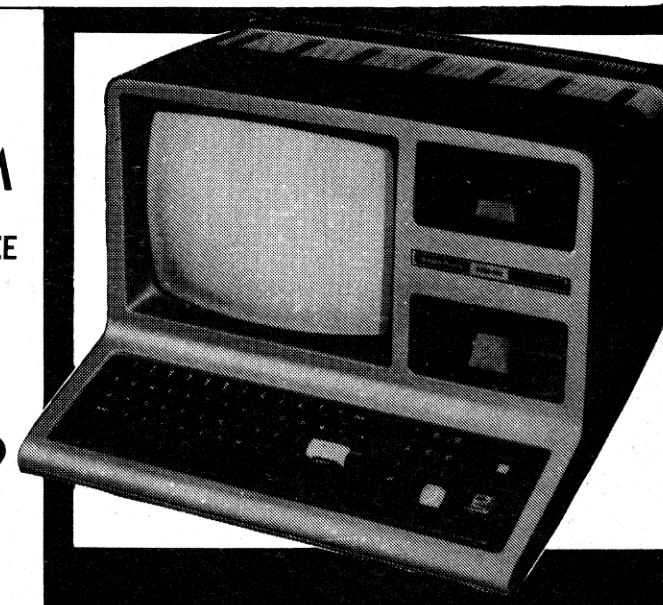
Disk Drive 3 ..... $379

Disk Drive 4 ..... $359

Model III DOS & Manual $21.95

16K RAM Kit $59

RS-232 Serial Interface $95



New low cost internal disk kit available to expand your storage capability. With this kit, now, you may expand your Model III computer up to four MTI 40 track disk drives, giving 175,000 bytes of storage per drive for a total of 700K.

The kit includes one 40 track disk drive, controller, power supply, cables, mounting hardware and installation documentation.

Manufacturer Direct Price ONLY..... $649

MICROCOMPUTER TECHNOLOGY, INC.

3304 W. MACARTHUR, SANTA ANA, CA 92704

★ PHONE (714) 979-9923 ★ TELEX #678401TAB IRIN

*Uses MTI Memory, Disk Drives & Components

® TRS-80® IS A REGISTERED TRADEMARK OF TANDY CORPORATION

M3-B

MasterCard VISA

ALL PRICES CASH DISCOUNTED
FREIGHT FOB FACTORY
ASK FOR FREE CATALOG

See List of Advertisers on page 306

Here's a RAM/ROM tutorial that even includes memory test routines.

Memories Are Made of This

Robert D. Randall
841 So. 50th St.
Lincoln, NE 68510

This article should answer some of the questions you have about computer memory and how it works in the TRS-80. I will also take a look at expanding memory in the keyboard and the expansion interface, as well as what to do if your computer memory ever goes on the blink.

To begin, let's look at the computer memory of a few decades ago. Magnetic core memory was probably the most popular for small computers and also used as secondary or external memory for larger systems in the 1950's and 60's. Magnetic core memory was developed at the Massachusetts Institute of Technology for the Whirlwind I computer. It had an access time of a few microseconds, (millionths of a second), was reliable, and was somewhat less expensive when compared to other types of memory in use at that time. It was not uncommon to have memories in the range of a few thousand to 32,000 words of storage. The drawbacks to these systems were their large physical size, their high power consumption, and their high price tags.

The magnetic core was made up of ferrite material, usually in the shape of little doughnuts. These doughnut shaped core elements were a millimeter or so in diameter and were strung by the thousands on a grid of wires. To store data the ferrite core was magnetized to read data, the magnetized ferrite core was used to induce an electrical current.

Random Acess Memory

Large scale integration has revolutionized the design of computers and other electronic devices. This is the process whereby tens of thousands of tiny circuits are fabricated upon a tiny chip of silicon, at times no more than a quarter of an inch on a side. What this has meant to computers should be apparent every time you power up your TRS-80.

If you own a TRS-80 with 16K memory, you will have eight 4116 16K RAM chips in your keyboard unit. 4116 is the model number of the RAM chip; 16K means the chip contains over 16,000 bits of storage; and RAM is an acronym for Random Access Memory.

RAM is a memory device that will write into or read from its storage any data the CPU/microprocessor requires, at any address the CPU specifies. The time required to do this is known as the RAM chips' access time, which is usually expressed in nanoseconds (NS). When you see an advertisement for extra memory, you will usually see a number like 450 ns or 250 ns after the chip model, meaning that the chip has an access time of 450 nanoseconds or 250 nanoseconds, which is fast when you think that a nanosecond is one billionth of a second. A nanosecond is to one second what one second is to 31.7 years.

There are eight RAM chips in the keyboard of the TRS-80 because the microprocessor chip is an eight-bit processor. This means that data is read into and from the chip eight bits at a time. In computer jargon, four bits equal one nybble and eight bits equal one byte. Twelve to sixteen bits equal a word.

Eight RAMs are necessary because only one bit may be addressed at a time in the 4116 RAM. In order to access eight bits of storage, you would need to access the

Table 1.

Phase 1	FF FF OO FF FF OO FF FF	FF = Major	OO = Minor
Phase 2	OO OO FF OO OO FF OO OO	OO = Major	FF = Minor
Phase 3	FF OO FF FF OO FF FF OO	FF = Major	OO = Minor
Phase 4	OO FF OO OO FF OO OO FF	OO = Major	FF = Minor
Phase 5	OO FF FF OO FF FF OO FF	FF = Major	OO = Minor
Phase 6	FF OO OO FF OO OO FF OO	OO = Major	FF = Minor

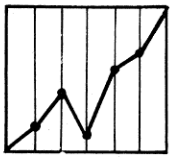
6 ways to give your TRS-80* a

+PLUS

Exhaustive research and professional standards bring you the best in business software.

EASYTRAK tm

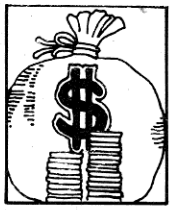
KEEP YOUR SALES CURVING UPWARD WITH EASYTRAK tm, a powerful, all-purpose activity tracking system. User-specified options enable you to monitor sales activity by territory, product line, salesman, or by combinations. Can monitor inquiries, sales calls and order booking. Production activity (by shift, by product, by day, by team, etc.), spending or income activity are simple to set up with EASYTRAK tm. Extensive video displays make available individual, group or total summaries, relative averages, and percentage data all at the touch of a button. Use of an 80-column printer is optional.



MODEL I/III $100
MODEL II $140

+ACCOUNTS RECEIVABLE

PUT MORE CASH IN YOUR BANK ACCOUNT with +Account Receivable's many collection/credit features, including average payment days, aging schedule and statements, Open-item system records sales activity this year and last, optional automatic discounts and salesman assignment. Cash receipts and A/R adjustments feature extensive on-line validation. And, yes, +Accounts Receivable handles the pesky new 9-digit zip code. Other optional features include service charges to selective customers; partial and "on-account" payments. Posts, at your option, to +General Ledger.



MODEL I/III $250
MODEL II $300

+ACCOUNTS PAYABLE

FUNNEL THAT STACK OF BILLS into +Accounts Payable system and create an orderly, manageable flow of vendor histories, cash requirements forecasts, check registers and checks, aging schedules, etc. Will accept manual checks, reversals, and adjustments. Pay by selected vendor, invoice, due date, discount dates, and optionally post directly to your +General Ledger. Supports 5-digit vendor numbers.

MODEL I/III $250
MODEL II $300

+GENERAL LEDGER

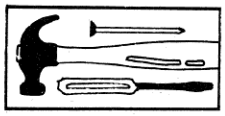
SLICE OUT MORE PROFIT by using +General Ledger to monitor your financial status. Features include fully-flexible financial statements, both budget and last year comparisons, special report options, monthly and quarterly trial balances, manual and/or automatic journal entries all with extensive audit trails. You structure the chart of accounts with up to 5 digit account numbers.

MODEL I/III $250
MODEL II $300

+FIXED ASSETS

A POWERFUL SET OF TOOLS TO CALCULATE and monitor fixed asset expenditures, book and tax depreciation, investment tax credit, etc. Will even forecast future depreciation for you. (Handy at budget time!) Code structure enables you to classify assets by departments, buildings, groups or other categories. Handles seven depreciation methods. Can post to +General Ledger for you.

MODEL I/III $250
MODEL II $300



+PAYROLL

KEEP YOUR EMPLOYEES HAPPY and smiling with prompt, accurate and professional payroll records. Will handle weekly, biweekly, semimonthly, monthly payrolls, produce checks, check registers, labor reports, earnings reports, Form 941's, W2's, etc. Can handle fixed/voluntary deductions, hourly/salary employees, bonuses, city and state taxes, etc. Easy to use and update tax tables. Automatic +General Ledger posting.

MODEL I/III $250
MODEL II $300

SPECIAL! All of the above: MODEL I/III $1250 MODEL II $1500

+PLUS SOFTWARE comes to you feature-packed from on-line validation to machine-language file handling. Extensive documentation and thorough installation guide accompany each order. All systems are furnished on disc. Source code is included. Texas residents add 5% sales tax.

VISA master charge

To order, call TOLL-FREE 24 hours
1-800-528-6050 EXT. 1562
(In Arizona, 1-800-352-0458 Ext. 1562)

+PLUS

PLUS COMPUTER TECHNOLOGY, INC. ✓131
POST OFFICE BOX 1152
ANGLETON, TEXAS 77515 (713) 849-1108

Dealer inquiries invited

*TRS-80 is a registered trademark of Tandy Corp.
*EASYTRAK is a trademark of Plus Computer Tech, Inc.

✓See List of Advertisers on page 306

same RAM chip eight times at eight different locations, increasing the time needed to access memory. Using eight RAM chips, all eight may be accessed simultaneously.

If you refer to the *TRS-80 Technical Reference Handbook*, you will see these eight RAM chips. They are represented by Z13 through Z20 on the first schematic sheet. The four most significant bits (MSB) of a byte are stored in RAM Z13, Z14, Z20, and Z15, and the four least significant bits (LSB) of a byte are stored in RAM chips Z19, Z18, Z16, and Z17. (The MSB of the hex number 7F is 7, the LSB is F.)

How Ram Works

Bits are stored in tiny cells in a rectangular array within the chip. To access any one of these cells, a coded binary address is input to an address decoder within RAM that selects one column and one row of the array. At the same time, a signal is sent from the CPU telling the RAM chip if it is to be a read or write operation. The desired data is then sent through the data lines.

The most simple storage cell in use today is made up of a small capacitor used to store a small electrical charge that represents a binary value of either 1 or 0. Usually 1 is represented by a plus charge of up to five volts and 0 is represented by ground, or one or two volts. An on/off switch (made of a small transistor) is used to connect the storage capacitor to a data line. There may be a large number of these storage capacitors sharing the same line, but only one cell can use the data line at any one time.

A storage cell is accessed as follows. The data lines act as a column indicator to the memory array. Selection lines correspond to rows at right angles to the data lines. When a selection line is activated, all storage cells on that line have their transistors turned on; because only one of these storage cells is on an activated data line at a time, only one storage cell is accessed.

The charge in the capacitor of a memory cell must be refreshed from time to time because of loss through capacitor leakage and accesses to it. Devices in RAM known as thresholding amplifiers, located on each of the RAM data lines, are responsible for this task. Whenever RAM is accessed the thresholding amplifier takes a sample of the signal and compares it to the threshold level. The threshold level is usually the charge midway between binary 1 and 0. The amplifier then regenerates the necessary binary level if the signal is low.

Regeneration of the threshold level is known as the refresh cycle of the RAM chip. If a RAM needs to be refreshed, it is known as a dynamic memory RAM. The TRS-80 is of this type. If a RAM does not need a refresh cycle, it is known as a static RAM.

Other Memory Devices

The TRS-80 also uses a memory device called a ROM, which contains BASIC and other routines needed for operation. ROM is an acronym for Read Only Memory. You

Listing 1.

```
1  CLS:INPUT"STARTING ADDRESS(XXXXD)";S:INPUT"ENDING ADDRESS(XXXXD)";E
5  D=225:FOR L=S TO E:POKE L,D:IF PEEK(L)<>D THEN 15 ELSE NEXTL
10 PRINT"TEST COMPLETED, NO ERRORS":STOP
15 PRINT L;"SHOULD'VE BEEN 225, BUT IT CONTAINS";PEEK(L):STOP
```

Listing 2.

```
                0010 ;*****************************************************
                0015 ;*        SET-UP CONSTANTS FOR RAMTST
                0020 ;*****************************************************
                0025 ;
3C00            0030 DCOUNT    EQU  3C00H          ;COUNT DSP.
3C95            0035 DPHASE    EQU  3C00H+149      ;PHASE DSP
3C9B            0040 DPHASD    EQU  3C00H+155      ;DATA DSP
3CA9            0045 DMAJBT    EQU  3C00H+169      ;MAJOR DSP
3CC0            0050 DINFOM    EQU  3C00H+192      ;INFORM DSP
3CC9            0055 DCONTS    EQU  3C00H+201      ;CONTENTS DSP
3CDD            0060 DMABYT    EQU  3C00H+221      ;MAJOR BYTE DSP
3C37            0065 DERROR    EQU  3C00H+55       ;ERROR DSP
3D1C            0070 DTITLE    EQU  3C00H+284      ;TITLE DSP
3DC0            0075 DPROMP    EQU  3C00H+448      ;PROM DSP
3DCE            0080 DAUTHR    EQU  3C00H+14       ;PROGR NAME
3DDB            0085 DFLASH    EQU  3C00H+475      ;FLASH DSP
3FC0            0090 DTSTLO    EQU  3C00H+960      ;LOW EXT. DSP
3FD2            0095 DSTART    EQU  DTSTLO+18      ;START DSP
3FDD            0100 DSPEND    EQU  DTSTLO+29      ;END DSP
3C06            0105 DSPCND    EQU  3C00H+6        ;COUNT DATA
3C3E            0110 DSPERD    EQU  DERROR+7       ;ERROR DATA
4020            0115 CURSOR    EQU  4020H          ;CURSOR POINTER
28A7            0120 PRINT     EQU  28A7H          ;SUB PRINT
05D9            0125 INPUTK    EQU  05D9H          ;SUB INPUT
                0130 ;
                0135 ;*****************************************************
                0140 ;*        START OF MAIN DRIVER
                0145 ;*****************************************************
                0150 ;         INITL. RAM LOCATIONS
42E9            0155           ORG  42E9H          ;START OF PROG
42E9  218747    0160           LD   HL,PHASE       ;GET LOC
42EC  3600      0165           LD   (HL),00H       ;ZAP PHASE
42EE  218547    0170           LD   HL,ERROR       ;GET LOC
42F1  3600      0175           LD   (HL),00H       ;ZAP ERROR
42F3  CDC901    0180           CALL 01C9H          ;CLS
42F6  111C3D    0185           LD   DE,DTITLE      ;GET LOC
42F9  ED532040  0190           LD   (CURSOR),DE    ;LOAD CURSOR
42FD  21CA45    0195           LD   HL,TEXT1       ;POINT TO TEXT
4300  CDA728    0200           CALL PRINT          ;DISPLAY
4303  11CE3D    0205           LD   DE,DAUTHR      ;GET LOC
4306  ED532040  0210           LD   (CURSOR),DE    ;LOAD CURSOR
430A  21D345    0215           LD   HL,TEXT2       ;POINT TO TEXT
430D  CDA728    0220           CALL PRINT          ;DISPLAY
4310  0604      0225 LDSTUP    LD   B,4            ;LOAD COUNTER
4312  C5        0230 GODLAY    PUSH BC             ;SAVE B
4313  010000    0235           LD   BC,0           ;ZAP B
4316  CD6000    0240           CALL 0060H          ;DELAY SUB
4319  C1        0245           POP  BC             ;GET B
431A  10F6      0250           DJNZ GODLAY         ;LOOP UNTIL B=0
431C  CD8544    0255           CALL CLPRMP         ;ZAP PROMPT
431F  11C03D    0260           LD   DE,DPROMP      ;GET LOC.
4322  ED532040  0265           LD   (CURSOR),DE    ;LOAD CURSOR
4326  21F745    0270           LD   HL,TEXT3       ;POINT TO TEXT
4329  CDA728    0275           CALL PRINT          ;DISPLAY IT
432C  2A2040    0280           LD   HL,(CURSOR)    ;SET UP POINTER
432F  CDD905    0285           CALL INPUTK         ;SUB INPUT
4332  7E        0290           LD   A,(HL)         ;GET 1ST BYTE
4333  FE2A      0295           CP   02AH           ;IS IT '*'
4335  CAEB43    0300           JP   Z,AUTO         ;YES-DO AUTO
4338  CD0244    0305           CALL COVINP         ;NO-CONVERT INP
433B  ED537D47  0310           LD   (START),DE     ;STORE START
433F  2A8147    0315           LD   HL,(AUTOLO)    ;GET FIXED LOW
4342  35        0320           INC  DE             ;ADJUST
4343  B7        0325           OR   A              ;ZAP FLAG
4344  ED52      0330           SBC  HL,DE          ;SUBTRACT
4346  FA5B43    0335           JP   M,GETEND       ;INPUT OK-GO ON
4349  CD8544    0340           CALL CLPRMP         ;ZAP PROMPT
434C  11C03D    0345           LD   DE,DPROMP      ;GET LOCATION
434F  ED532040  0350           LD   (CURSOR),DE    ;LOAD CURSOR
4353  215947    0355           LD   HL,TEXT15      ;POINT TO TEXT
4356  CDA728    0360           CALL PRINT          ;DISPLAY
4359  18B5      0365           JR   LDSTUP         ;GOTO DELAY
435B  CD8544    0370 GETEND    CALL CLPRMP         ;ZAP PROMPT
435E  11C03D    0375           LD   DE,DPROMP      ;GET LOCATION
4361  ED532040  0380           LD   (CURSOR),DE    ;LOAD CURSOR
4365  211E46    0385           LD   HL,TEXT4       ;POINT TO TEXT
4368  CDA728    0390           CALL PRINT          ;DISPLAY
```

Program continues

```
436B  2A2040    0395            LD    HL,(CURSOR)      ;SET POINTER
436E  CDD905    0400            CALL  INPUTK           ;SUB INPUT
4371  CD0244    0405            CALL  COVINP           ;CONVERT TO HEX
4374  ED537F47  0410            LD    (END),DE         ;STORE END
4378  CD8544    0415 GETCNT     CALL  CLPRMP           ;ZAP PROMPT
437B  11C03D    0420            LD    DE,DPROMP        ;GET LOCATION
437E  ED532040  0425            LD    (CURSOR),DE      ;LOAD CURSOR
4382  213C46    0430            LD    HL,TEXT5         ;POINT TO TEXT
4385  CDA728    0435            CALL  PRINT            ;DISPLAY
4388  2A2040    0440            LD    HL,(CURSOR)      ;SET POINTER
438B  CDD905    0445            CALL  INPUTK           ;SUB INPUT
438E  CD0244    0450            CALL  COVINP           ;CONVERT TO HEX
4391  ED538347  0455            LD    (COUNT),DE       ;STORE COUNT
4395  11003C    0460            LD    DE,DCOUNT        ;GET LOCATION
4398  ED532040  0465            LD    (CURSOR),DE      ;LOAD CURSOR
439C  215F46    0470            LD    HL,TEXT6         ;POINT TO TEXT
439F  CDA728    0475            CALL  PRINT            ;DISPLAY
43A2  CD4944    0480            CALL  CNTDSP           ;DISPLAY COUNT
43A5  11373C    0485            LD    DE,DERROR        ;GET LOCATION
43A8  ED532040  0490            LD    (CURSOR),DE      ;LOAD CURSOR
43AC  216646    0495            LD    HL,TEXT7         ;POINT TO TEXT
43AF  CDA728    0500            CALL  PRINT            ;DISPLAY
43B2  CD5B44    0505            CALL  ERRDSP           ;DSP ERROR DATA
43B5  CD8544    0510            CALL  CLPRMP           ;ZAP PROMPT
43B8  11C03F    0515            LD    DE,DTSTLO        ;GET LOCATION
43BB  ED532040  0520            LD    (CURSOR),DE      ;LOAD CURSOR
43BF  216E46    0525            LD    HL,TEXT8         ;POINT TO TEXT
43C2  CDA728    0530            CALL  PRINT            ;DISPLAY
43C5  CD6644    0535            CALL  DSPLOC           ;DISP EXTENTS
43C8  11C03D    0540            LD    DE,DPROMP        ;GET LOCATION
43CB  ED532040  0545            LD    (CURSOR),DE      ;LOAD CURSOR
43CF  219146    0550            LD    HL,TEXT9         ;POINT TO TEXT
43D2  CDA728    0555            CALL  PRINT            ;DISPLAY
43D5  CD9344    0560            CALL  TEST             ;MAIN SUB
43D8  CD8544    0565 PGDONE     CALL  CLPRMP           ;ZAP PROMPT
43DB  11C03D    0570            LD    DE,DPROMP        ;GET LOCATION
43DE  ED532040  0575            LD    (CURSOR),DE      ;LOAD CURSOR
43E2  21AB46    0580            LD    HL,TEXT10        ;POINT TO TEXT
43E5  CDA728    0585            CALL  PRINT            ;DISPLAY
43E8  C3191A    0590            JP    1A19H            ;END-RETURN TO BASIC
                0595 ;*************************************************
                0600 ;*         END OF DRIVER PROGRAM
                0605 ;*************************************************
                0610 ;*************************************************
                0615 ;*                 SUBROUTINES
                0620 ;* AUTO *  FIND THE TOP OF MEMORY
                0625 ;*************************************************
                0630 ;
43EB  2A8147    0635 AUTO       LD    HL,(AUTOLO)      ;GET LOW MEMORY
43EE  227D47    0640            LD    (START),HL       ;STORE IN START
43F1  36AA      0645 FILLUP     LD    (HL),0AAH        ;STICK IN AA
43F3  7E        0650            LD    A,(HL)           ;READ BACK
43F4  FEAA      0655            CP    0AAH             ;IS IT AA?
43F6  2807      0660            JR    Z,LOOP           ;NO-CONTINUE
43F8  2B        0665            DEC   HL               ;YES-CORRECT POINTER
43F9  227F47    0670            LD    (END),HL         ;STORE END OF TEST
43FC  C37843    0675            JP    GETCNT           ;GET REPETITIONS
43FF  23        0680 LOOP       INC   HL               ;ADJUST POINTER
4400  18EF      0685            JR    FILLUP           ;LOOK HIGHER
                0690 ;
                0695 ;*************************************************
                0700 ;* COVINP   CONVERT ASCII TO HEX
                0705 ;*************************************************
4402  CD0B44    0710 COVINP     CALL  ASXHEX           ;CONVERSION SUB
4405  57        0715            LD    D,A              ;STORE HEX IN D
4406  CD0B44    0720            CALL  ASXHEX           ;CONVERSION SUB
4409  5F        0725            LD    E,A              ;STORE HEX IN E
440A  C9        0730            RET                    ;RETURN W/HEX IN DE
440B  0E00      0735 ASXHEX     LD    C,00H            ;ZAP REG C
440D  7E        0740            LD    A,(HL)           ;GET 1ST BYTE
440E  CD1844    0745            CALL  CVERT            ;CALL BYTE CONVERTER
4411  23        0750            INC   HL               ;POINT TO NEXT BYTE
4412  7E        0755            LD    A,(HL)           ;GET 2ND BYTE
4413  CD1844    0760            CALL  CVERT            ;CONVERT BYTE
4416  23        0765            INC   HL               ;POINT TO NEXT
4417  C9        0770            RET                    ;BYTE CONVERTED
4418  CB21      0775 CVERT      SLA   C                ;SHIFT C LEFT 1
441A  CB21      0780            SLA   C                ;AGAIN
441C  CB21      0785            SLA   C                ;AGAIN
441E  CB21      0790            SLA   C                ;DO ONE MOR TIME
4420  D630      0795            SUB   30H              ;SUBTRACT 30H
4422  FE0A      0800            CP    10               ;GREATER THAN 10
4424  FA2944    0805            JP    M,JUMP           ;NO-STORE IT
4427  D607      0810            SUB   7                ;SUBTRACT 7
4429  81        0815 JUMP       ADD   A,C              ;PUT WITH REG C
442A  4F        0820            LD    C,A              ;COPY BACK TO C
442B  C9        0825            RET                    ;RETURN-HEX IN REG C
                0830 ;
                0835 ;*************************************************
                0840 ;* BXASH  CONVERT HEX BACK TO ASCII AND DISPLAY
                0845 ;*************************************************
442C  3EF0      0850 BXASH      LD    A,0F0H           ;PUT MASK IN A
442E  A1        0855            AND   C                ;MASK OFF C
442F  0F        0860            RRCA                   ;ROTATE RIGHT
```

Program continues

cannot write into ROM, only read from it. Data is put into the ROM at the time it is manufactured. ROMs are like RAMs, except their storage capacitors are replaced with an open circuit or are connected to ground, representing one or the other of the two binary states.

Another memory device is called PROM. PROM is an acronym for Programmable Read Only Memory. When a PROM is manufactured, its storage cells have a small fusible link from their transistors to ground in place of the storage capacitors. Data is placed in the array by applying a pattern of electrical signals strong enough to break the unwanted links. Once a PROM has been programmed, it cannot be altered. A PROM will retain its data after power has been removed from it.

The next device is an EPROM, an acronym for Erasable Programmable Read Only Memory. Data is written into an EPROM through electronic means, but only after all storage cells have been erased. In order to erase the cells, ultraviolet light is used. Once data has been written into the cells, they cannot be altered until all cells are once again erased.

Enlarge Your Memory

The Z-80 microprocessor in the TRS-80 will address up to 65536 bytes of RAM. If you have a 4K system, you can add up to 16K of total RAM within the keyboard by buying one of many conversion kits or by having Radio Shack install one. Most of these kits come with the RAM chips, jumpers needed for installation and instructions.

(Remember that if you open up your keyboard, you will void your warranty if it is still in effect.)

If you already have 16K of RAM in your keyboard and want more, you will need to buy an expansion interface. This can give you up to 48K of memory.

If you buy the interface without memory, it's easy to install. If you are inserting only 16K of RAM, find RAM sockets Z9 through Z16 in the interface. If you are installing 32K of RAM at one time, you needn't worry about which sockets you fill first. For 32K, you will fill sockets Z1 through Z8 and sockets Z9 through Z16. You will want to use low power 4116 RAMs with an access of at least 450 ns.

Caution is the word when handling RAM chips. They will arrive sitting in conductive foam or in a conductive tube or foil (any static discharge will damage the chips). When handling MOS (Metal Oxide Semiconductor) devices you might consider grounding yourself with special straps. Try not to wear clothing that contains static. Using an IC insertion tool, such as Radio Shack's 276-1574, is also helpful when working with chips.

The number one pin of the chip must agree with the number one hole of the socket. The first pin usually has a small circle over it, or a notch cut into the end where the number one pin is located. If you are un-

NEW!

COMPLETE

MODEL III*

DISK SYSTEMS

FROM AEROCOMP

AT LAST
This is what you have been waiting for! Complete, on-board disk systems featuring the latest Radio Shack Model III * computers and the finest disk drives on the market - AEROCOMP. Four models to choose from - all with 48k RAM. The AEROCOMP/Mod. III Systems are available with 40-track "flippy" drives, 80-track "flippy" drives, 40-track dual-headed drives or 80-track dual-headed drives. There's one to suit your needs.

DOUBLE DENSITY
All models of the AEROCOMP/Mod. III operate in double density. This means something in the order of 1.8 times the storage of single density. That means fewer diskettes (a big cost savings over the long run) and more data on line at any given time.

OPERATING SYSTEM
Every AEROCOMP/Mod. III System includes the Model III DOSPLUS Operating System. This system is compatible with the Mod. I software and will read Mod. I disks with NO conversion. You will find this an outstanding disk operating system loaded with great features.

FOUR MODELS

- **MOD III/40F**
  48K Mod. III with two on-board 40-track "flippy" disk drives & Mod. III DOS.....$2,350.00
- **MOD III/80F**
  48K Mod. III with two on-board 80-track "flippy" disk drives & Mod. III DOS.....$2,499.00
- **MOD III/40DH**
  48K Mod. III with two on-board 40-track Dual-headed disk drives & Mod. III DOS.....$2,499.00
- **MOD III/80DH**
  48K Mod. III with two on-board 80-track Dual-headed disk drives & Mod. III DOS.....$2,899.00

COMPARE FEATURES

- ✻ Choice of "Flippy" or Dual-Headed drives.
- ✻ Radio Shack warranty on computer -90 days.
- ✻ AEROCOMP warranty on the drives -120 days.
- ✻ Mod. III DOSPLUS Operating System included.
- ✻ 48K Ram.
- ✻ Double Density - 80% increase in storage over single density.
- ✻ Convenient desk- top enclosure with no cables strung all over.
- ✻ Plug it in and GO!

ORDER TODAY!
See the opposite page for our standard ordering policy. The only difference in our regular policy will be: NO COD's on the AEROCOMP/Mod. III's. We will accept only VISA & MASTERCARD or payment with order. These units ship by motor freight and will be shipped freight charges collect. Please remember our toll free lines will accept orders only and will not answer questions. The number for technical information is (214) 337-4346. Please note that quanities are limited and we will ship on a first come first served basis. Thank you for making AEROCOMP a success!

PRINTER SPECIAL
EPSON MX80.....$499.00
Add $30.00 for TRS80 cable and $6.00 for shipping & ins.

ORDER TODAY FROM

AEROCOMP
Redbird Airport, Bldg. 8
P.O. Box 24829 ✓387
Dallas, TX 75224

See Opposite Page ⇨

* TRADE MARK OF TANDY CORP. AROCOMP/21

THE LATEST

40 & 80 Track "FLIPPY" Drives

for TRS-80*

REAL VALUE

AEROCOMP offers the best value in microcomputer disc drives on the market today! Reliability, features and cost tough to beat. We deliver...and we stand behind our products, as evidenced by the only FREE TRIAL OFFER in the industry. Examine your systems needs and order today!

MYSTERY REMOVED

There appears to be some confusion in the terminology used to describe disc drives and their features. Here's what we mean:

- **FLIPPY** Allows the use of both sides of a diskette with a single-headed drive by simply turning the diskette over (model 40-1&80-1).
- **TRACK DENSITY** Specified in tracks per inch (TPI). Refers to the number of tracks per radial inch on the diskette. Typically 48 TPI=40 usable tracks and 96 TPI=80 usable tracks.
- **DOUBLE DENSITY** Refers to recording density in bits per inch (bpi). Typically single density means data can be recorded up to 2,938 bpi; double density means data can be recourded up to 5,876 bpi.
- **DOUBLE SIDED** Refers to number of read/write heads. Single-sided is one head, read/write one side only; double-sided is dual heads allowing read/write operations on both sides of the diskette. A double sided drive appears as two seperate drives to the controller. **(Model 80-2 & 160-2)**
- **ACCESS TIME** The time required for the head to move from one track to the next. Typacilly 5 to 40 milliseconds (ms).

SELECT YOURS!

- **40-Track "FLIPPY" $349.95**
(Model 40-1) 48 TPI, single dens. 125K bytes/side, double dens. 250K/side.
- **80-TRACK "FLIPPY" $459.95**
(Mod. 80-1) 96 TPI, single dens. 250K bytes/side, double dens. 500K/side.
- **40 TRACK DUAL HEAD $459.95**
(Mod. 80-2) 48 TPI, double-sided, 40 tracks/side; single dens. 250K bytes, double dens. 500K.
- **80 TRACK DUAL HEAD $599.95**
(Mod. 160-2) 96 TPI, double-sided, 80 tracks/side; single dens. 500K bytes, double dens. 1 megabytes.

NOTE: All capacity values are unformated. All models capable of single or double density. All with power supply/silver enclosure. 115 VAC, 50-60 Hz. 115/230 VAC available.

STARTER A

40-Track drive, 2-drive cable, TRSDOS 2.3 Disk & Manual, Freight & Ins.

$339.95

(Reg. $380.00)

STARTER B

40-Track FLIPPY drive, 2-drive cable,TRSDOS 2.3 Disk & Manual,Freight & Ins.

$369.95

(Reg. $401.00)

SPECIAL PACKAGES

#1 40-Track FLIPPY drive
2-Drive cable
Newdos/80
Freight & Ins.$459.00(reg.$528.00)

#2 80-Track FLIPPY drive
2-Drive cable
Newdos/80
Freight & Ins. $569.00 (reg.$638.00)

#3 TWO (2) 40-Track FLIPPY drives
4-Drive cable
Newdos/80
Freight & Ins. $785.00 (REG. $893.00)

#4 TWO (2) 80-Track FLIPPY drives
4-Drive cable
Newdos/80
Freight & Ins. $999.00 (reg.$1113.85)

#5 TWO (2) 40-Track DUAL HEAD Drives
Cable
Newdos/80
Freight & Ins. $995.00 (Reg. $1105.00)

#6 TWO (2) 80-Track DUAL HEAD Drives
Cable
Newdos/80
Freight & Ins. $1,245.00
(Reg. $1,385.00)

FREE TRIAL OFFER

Order your AEROCOMP Disc Drive and use it with your system for up to 14 days. If you are not satisfied for ANY REASON (except misuse or improper handling),return it, packed in the original shipping container, for a full refund.(Special packages will be prorated). We have complete confidence in our products and we know you will be satisfied! **ORDER TODAY!!**

WARRANTY

We offer you a 120 day unconditional warrenty on parts and labor against any defect in materials and workmanship. In the event service, for any reason, becomes nescessary, our service department is fast, friendly and cooperative.

100% TESTED

AEROCOMP Disc Drives are completely assembled at the factory and ready to plug in when you receive them. Each drive is 100% bench tested prior to shipment. We even enclose a copy of the test checklist, signed by the test technician, with every drive. AEROCOMP MEANS RELIABILITY!

ORDER NOW!!

To order by mail, specify Model Number(s) of Drive, cable, etc. (above), enclose check, money order, VISA or MASTERCHARGE card number and expiration date, or request C.O.D. shipment. Texas residents add 5% sales tax. Add $5.00 per drive for shipping and handling. Please allow 2 weeks for personel checks to clear our bank. No personel checks will be accepted on C.O.D. shipments-cash, money orders or certified checks only. You will receive a card showing the exact C.O.D. amount before your shipment arrives. Be sure to include your name and shipping address. WE SHIP PROMPTLY! In the event there is a slight delay, you will be notified of the shipping date and we will NOT charge your bankcard until the day we ship!

COMPARE AND BUY AEROCOMP!

	"FLIPPY"	ACCESS TIME (track to track)	HEAD LOAD SOLENOID	DISC EJECTOR	CAPACITY (unformated single density)	EASY-ENTRY DOOR	FREE TRIAL
AEROCOMP	YES	5ms.	YES	YES	250K bytes (both sides)	YES	YES
RADIO SHACK*	NO	40ms.	YES	NO	109K bytes	NO	NO
PERCOM	YES	25ms.	YES	NO	250K bytes (both sides)	YES	NO
MPI	NO	5ms.	YES	YES	125K bytes	YES	NO
SHUGART	NO	40ms.	YES	NO	109K bytes	NO	NO
TANDON	NO	5ms.	NO	NO	125K bytes	NO	NO

Factual material from current manufacturer's data sheets is believed reliable but cannot be guaranteed, comparing Aerocomp Model 40-1 to similar models.

The TRS-80* expansion interface limits the track to track access time to 12ms.

*Trademark of Tandy/Radio Shack.

WRITE AEROCOMP TODAY FOR MORE VALUES !!!

CALL TOLL FREE FOR FAST SERVICE
(800) 824-7888, OPERATOR 24
FOR VISA/MASTERCHARGE/C.O.D. ORDERS
California dial (800) 852-7777, Operator 24. Alaska and Hawaii dial (800) 824-7919, Operator 24.
TOLL FREE LINES WILL ACCEPT ORDERS ONLY!
For Applications and Technical information, call (214) 337-4346 or drop us a card.

Dealers inqiries invited

AEROCOMP
Redbird Airport, Bldg. 8
P.O. Box 24829
Dallas, TX 75224

✓387

✓See List of Advertisers on page 306

sure about the pins, find someone to help you. If you plug the chip in backwards, you could fry it when you turn on the power.

After you have the chip sitting in the socket, make sure you haven't bent any pins under the body of the chip. Don't use too much force when you press the chip into the socket.

Once you've seated the chips, put everything back together and power up your system. Remember, if you do not have a disk on your expansion interface, hold the Break key down when you power up. This avoids a screen full of garbage. Type in "? MEM", and your new amount of RAM should be displayed in decimal on the CRT.

Memory Failure

RAM problems may show up in a variety of ways. I will list only a few of the more common symptoms.

If you are running a program known to be error free and the program begins to bomb out (abend), or if your known variables begin to become different values for no reason, or the graphics begin to look like garbage on the tube, it might not be a bad idea to check your memory. If your memory checks out okay, I would suggest taking your system to a Radio Shack Repair Center.

"If. . . your program begins to bomb out. . . it might not be a bad idea to check your memory."

The best way to find a RAM problem is to let your computer find it. Load a diagnostic program into your system that will read and write specific data into and out of specific address locations. When the program finds a location that does not respond in the way that it should, your problem is half solved. The next problem is to determine which of the eight RAM chips are bad.

An easy approach to the first problem would be to write a simple program in BASIC (Listing 1). This program will write a value of 255 (FF in hex) into the RAM locations you input through prompts from the program. The program will first write 255 into an address and then read the data back and compare it. If the compare is not equal, the program will branch to an error display routine and stop. If no errors are encountered, the program will display this information at the end of the test.

Listing 1 is not very fast, nor is it completely accurate. What, for example, would happen if a bit in RAM was stuck at 1 (a bit that would not register a 0)? Program Listing 1 would never detect such an error. What would happen if the error was in the area of RAM that our program must execute out of? The program might not work, or the problem might not be detected.

```
4430  0F        0865            RRCA                ;AGAIN
4431  0F        0870            RRCA                ;AGAIN
4432  0F        0875            RRCA                ;ONE MORE TIME
4433  CD3D44    0880            CALL CVERT1         ;DO CONVERSION
4436  3E0F      0885            LD   A,0FH          ;LOAD A WITH OF
4438  A1        0890            AND  C              ;MASK OFF C
4439  CD3D44    0895            CALL CVERT1         ;CONVERT
443C  C9        0900            RET                 ;CONVERSION DONE
443D  C630      0905 CVERT1     ADD  A,30H          ;ADD 30H
443F  FE3A      0910            CP   3AH            ;IS IT LESS THEN 10?
4441  FA4644    0915            JP   M,JUMP1        ;YES-GET READY TO STORE
4444  C607      0920            ADD  A,7            ;NO-ADJUST
4446  77        0925 JUMP1      LD   (HL),A         ;DISPLAY IT
4447  23        0930            INC  HL             ;POINT TO NEXT
4448  C9        0935            RET                 ;RETURN AND GET NEXT BYTE
                0940 ;
                0945 ;*****************************************************
                0950 ;* CNTDSP  DISPLAY PROGRAM REPETITIONS
                0955 ;*****************************************************
4449  E5        0960 CNTDSP     PUSH HL             ;SAVE ON STACK
444A  21063C    0965            LD   HL,DSPCND      ;POINT FOR DISPLAY
444D  ED5B8347  0970            LD   DE,(COUNT)     ;GET COUNT
4451  4A        0975            LD   C,D            ;LOAD MSB INTO C
4452  CD2C44    0980            CALL BXASH          ;CONVERT TO ASCII
4455  4B        0985            LD   C,E            ;LOAD LSB INTO C
4456  CD2C44    0990            CALL BXASH          ;CONVERT TO ASCII
4459  E1        0995            POP  HL             ;GET HL BACK
445A  C9        1000            RET                 ;RETURN-COUNT DISPLAYED
                1005 ;*****************************************************
                1010 ;* ERRDSP  DISPLAY NUMBER OF ERRORS
                1015 ;*****************************************************
445B  213E3C    1020 ERRDSP     LD   HL,DSPERD      ;POINT FOR DISPLAY
445E  3A8547    1025            LD   A,(ERROR)      ;GET ERROR COUNT
4461  4F        1030            LD   C,A            ;LOAD INTO C
4462  CD2C44    1035            CALL BXASH          ;CONVERT TO ASCII
4465  C9        1040            RET                 ;RETURN-COUNT OF ERRORS
                                                      DISP.
                1045 ;*****************************************************
                1050 ;* DSPLOC  DISPLAY MEMORY LOCATION
                1055 ;*****************************************************
4466  21D23F    1065 DSPLOC     LD   HL,DSTART      ;POINT TO SCREEN
4469  ED5B7D47  1070            LD   DE,(START)     ;GET START
446D  4A        1075            LD   C,D            ;LOAD MSB
446E  CD2C44    1080            CALL BXASH          ;CONVERT TO ASCII
4471  4B        1085            LD   C,E            ;LOAD LSB
4472  CD2C44    1090            CALL BXASH          ;CONVERT TO ASCII
4475  21DD3F    1095            LD   HL,DSPEND      ;POINT TO DISPLAY
4478  ED5B7F47  1100            LD   DE,(END)       ;GET END
447C  4A        1105            LD   C,D            ;LOAD MSB
447D  CD2C44    1110            CALL BXASH          ;CONVERT TO ASCII
4480  4B        1115            LD   C,E            ;LOAD LSB
4481  CD2C44    1120            CALL BXASH          ;CONVERT TO ASCII
4484  C9        1125            RET                 ;RETURN-COMPLETE
                1130 ;*****************************************************
                1135 ;* CLPRMP   ZAP PROMPT POSITION
                1140 ;*****************************************************
4485  11C03D    1150 CLPRMP     LD   DE,DPROMP      ;GET LOCATION
4488  ED532040  1155            LD   (CURSOR),DE    ;LOAD CURSOR
448C  21EA46    1160            LD   HL,BLANK       ;POINT TO TEXT
448F  CDA728    1165            CALL PRINT          ;DISPLAY
4492  C9        1170            RET                 ;PROMPT CLEAR-RETURN
                1175 ;*****************************************************
                1180 ;* TEST MAIN SUBROUTINE  TEST MEMORY
                1185 ;*****************************************************
4493  3E02      1195 TEST       LD   A,2            ;LOAD SPACE KEY
4495  328647    1200 NEXONE     LD   (CNTPOS),A     ;SAVE IT
4498  3EFF      1205            LD   A,0FFH         ;LOAD A WITH FF
449A  4F        1210 GETNEX     LD   C,A            ;STORE IN C
449B  CD9D45    1215            CALL PHASEP         ;DISPLAY PHASE
449E  CDB744    1220            CALL FILMEM         ;LOAD UP MEMORY-ALL
44A1  CDC644    1225            CALL FILLOP         ;LOAD UP MEMORY-SOME
44A4  CDDB44    1230            CALL VERIFY         ;CHECK-OUT LOADS
44A7  79        1235            LD   A,C            ;GET FILL BYTE
44A8  2F        1240            CPL                 ;COMPLIMENT A
44A9  B7        1245            OR   A              ;IS IT ZERO?
44AA  28FE      1250            JR   Z,GETNEX       ;YES-DO NEXT PHASE
44AC  3A8647    1255            LD   A,(CNTPOS)     ;GET SPACE
44AF  FE00      1260            CP   00             ;ARE WE DONE?
44B1  CA0D45    1265            JP   Z,CHKCNT       ;TEST DONE-IS PROGRAM?
44B4  3D        1270            DEC  A              ;NO-DO NEXT SPACE
44B5  18DE      1275            JR   NEXONE         ;CONTINUE
44B7  21DB3D    1280 FILMEM     LD   HL,DFLASH      ;GET LOCATION
44BA  3657      1285            LD   (HL),57H       ;DISPLAY W
44BC  CDFC44    1290            CALL GETEXT         ;GET EXTENTS
44BF  71        1295 STUFF      LD   (HL),C         ;STUFF BYTE
44C0  CD0245    1300            CALL CHKEND         ;IS MEMORY FULL
44C3  C8        1305            RET  Z              ;IF Z THEN RETURN
44C4  18F9      1310            JR   STUFF          ;KEEP STUFFING
44C6  CDFC44    1315 FILLOP     CALL GETEXT         ;GET EXTENTS
44C9  47        1320            LD   B,A            ;LOAD B WITH SPACE
44CA  FE00      1325            CP   00             ;TEST ALL SPACES DONE?
44CC  2005      1330            JR   NZ,SPADWN      ;NO-SPACE DOWN
44CE  79        1335 STUFIT     LD   A,C            ;LOAD A
44CF  2F        1340            CPL                 ;COMPLIMENT A
```

Program continues

```
44D0  77        1345            LD   (HL),A          ;STUFF A
44D1  0603      1350            LD   B,3             ;LOAD SPACE
44D3  CD0245    1355 SPADWN     CALL CHKEND          ;IS MEMORY FULL
44D6  C8        1360            RET  Z               ;RETURN IF YES
44D7  10FA      1365            DJNZ SPADWN          ;SPACE UNTIL RIGHT
44D9  18F3      1370            JR   STUFIT          ;DO ANOTHER STUFF
44DB  21DB3D    1375 VERIFY     LD   HL,DFLASH       ;GET LOCATION
44DE  3652      1380            LD   (HL),52H        ;DISPLAY R
44E0  CDFC44    1385            CALL GETEXT          ;GET EXTENTS
44E3  47        1390            LD   B,A             ;LOAD SPACE
44E4  FE00      1395            CP   00              ;IS SPACE 00?
44E6  2007      1400            JR   NZ,VERFAL       ;CHECK MAJOR
44E8  79        1405 VERSOM     LD   A,C             ;LOAD A
44E9  2F        1410            CPL                  ;COMPLIMENT A
44EA  BE        1415            CP   (HL)            ;ARE THEY EQUAL?
44EB  0603      1420            LD   B,3             ;LOAD SPACE
44ED  1802      1425            JR   ERROUT          ;CHECK FOR ERROR
44EF  79        1430 VERFAL     LD   A,C             ;LOAD A
44F0  BE        1435            CP   (HL)            ;IS MEMORY CORRECT?
44F1  C42445    1440 ERROUT     CALL NZ,FAIL         ;NO-GOTO FAIL
44F4  CD0245    1445            CALL CHKEND          ;END OF MEMORY?
44F7  C8        1450            RET  Z               ;YES,RETURN
44F8  10F5      1455            DJNZ VERFAL          ;CHECK MAJOR
44FA  18EC      1460            JR   VERSOM          ;CHECK MINOR
44FC  2A7D47    1465 GETEXT     LD   HL,(START)      ;GET START
44FF  3A8647    1470            LD   A,(CNTPOS)      ;GET SPACE
                1475 ;*****************************************************
                1480 ;* CHKEND  CHECK FOR END OF MEMORY EXTENT
                1485 ;*****************************************************
4502  E5        1490 CHKEND     PUSH HL              ;SAVE HL ON STACK
4503  EB        1495            EX   DE,HL           ;LOAD DE
4504  2A7F47    1500            LD   HL,(END)        ;PUT END IN HL
4507  B7        1505            OR   A               ;CLEAR FLAG
4508  ED52      1510            SBC  HL,DE           ;ARE WE AT END OF MEMORY?
450A  E1        1515            POP  HL              ;GET HL BACK
450B  23        1520            INC  HL              ;POINT 1 HIGHER IN CASE NOT
450C  C9        1525            RET                  ;RETURN-IF Z THEN EXIT
                                                      CALLER
                1530 ;*****************************************************
                1535 ;* CHKCNT  CHECK ON PROGRAM REPETITIONS
                1540 ;*****************************************************
450D  2A8347    1545 CHKCNT     LD   HL,(COUNT)      ;GET PROGRAM COUNT
4510  2B        1550            DEC  HL              ;DEC. ONE FROM COUNT
4511  228347    1555            LD   (COUNT),HL      ;STORE NEW COUNT
4514  CD4944    1560            CALL CNTDSP          ;DISPLAY NEW COUNT
4517  3E00      1565            LD   A,0             ;ZAP
4519  BC        1570            CP   H               ;IS MSB=0?
451A  C29344    1575            JP   NZ,TEST         ;NO-DO ANOTHER TEST
451D  BD        1580            CP   L               ;IS LSB=0?
451E  C29344    1585            JP   NZ,TEST         ;NO-DO ANOTHER TEST
4521  C3D843    1590            JP   PGDONE          ;YES-PROGRAM ABOUT DONE
                1595 ;*****************************************************
                1600 ;* FAIL    BAD MEMORY BYTE HAS BEEN FOUND
                1605 ;*****************************************************
4524  C5        1610 FAIL       PUSH BC              ;SAVE BC
4525  E5        1615            PUSH HL              ;SAVE HL
4526  E5        1620            PUSH HL              ;AGAIN
4527  C5        1625            PUSH BC              ;SAVE BC AGAIN
4528  E5        1630            PUSH HL              ;SAVE HL ONE MORE TIME
4529  11C03C    1635            LD   DE,DINFORM      ;GET LOCATION
452C  ED532040  1640            LD   (CURSOR),DE     ;LOAD CURSOR
4530  213B47    1645            LD   HL,TEXT14       ;POINT TO TEXT
4533  CDA728    1650            CALL PRINT           ;DISPLAY IT
4536  E1        1655            POP  HL              ;GET MEMORY LOCATION
4537  4E        1660            LD   C,(HL)          ;LOAD CONTENTS
4538  21C93C    1665            LD   HL,DCONTS       ;POINT TO CRT
453B  CD2C44    1670            CALL BXASH           ;CONVERT TO ASCII AND
                                                      DISPLAY
453E  C1        1675            POP  BC              ;GET MAJOR BYTE
453F  21DD3C    1680            LD   HL,DMABYT       ;POINT TO CRT
4542  CD2C44    1685            CALL BXASH           ;CONVERT AND DISPLAY
4545  218547    1690            LD   HL,ERROR        ;GET ADDRESS
4548  34        1695            INC  (HL)            ;ADD 1 TO ERROR CONTENTS
4549  CD5B44    1700            CALL ERRDSP          ;DISPLAY ERRORS
454C  CD8544    1705            CALL CLPRMP          ;ZAP PROMPT
454F  11C03D    1710            LD   DE,DPROMP       ;GET LOCATION
4552  ED532040  1715            LD   (CURSOR),DE     ;LOAD CURSOR
4556  21C446    1720            LD   HL,TEXT11       ;POINT TO TEXT
4559  CDA728    1725            CALL PRINT           ;DISPLAY
455C  2A2040    1730            LD   HL,(CURSOR)     ;GET READY
455F  D1        1735            POP  DE              ;GET BAD ADDRESS
4560  4A        1740            LD   C,D             ;LOAD MSB
4561  CD2C44    1745            CALL BXASH           ;CONVERT TO ASCII
4564  4B        1750            LD   C,E             ;LOAD LSB
4565  CD2C44    1755            CALL BXASH           ;CONVERT TO ASCII
4568  222040    1760            LD   (CURSOR),HL     ;LOAD CURSOR
456B  21D746    1765            LD   HL,TEXT12       ;POINT TO TEXT
456E  CDA728    1770            CALL PRINT           ;DISPLAY
4571  2A2040    1775            LD   HL,(CURSOR)     ;GET READY FOR INPUT
4574  CDD905    1780            CALL INPUTK          ;GET INPUT
4577  7E        1785            LD   A,(HL)          ;GET 1ST CHARACTER
4578  FE59      1790            CP   59H             ;IS IT Y?
457A  C2D843    1795            JP   NZ,PGDONE       ;NO-GET READY TO END
457D  CD8544    1800            CALL CLPRMP          ;YES-CLEAR PROMPT
```

Program continues

If you're looking for the best prices in the U.S.A. on

TRS-80®

MICROCOMPUTERS

We have consistently offered the TRS-80 line at savings **up to 20%**, which means you can save $150 to $1500 by buying directly from Computer Discount of America.

TRS-80 Model II, 64K System, with disc drive only $3385.00

Other TRS-80 Model II, or Model III computers and systems, Color Computers, and Pocket Computers are in stock at similar savings.

Our savings are as big on expansion interfaces, printers, diskettes – everything for your TRS-80 System.

ATARI®

MICROCOMPUTERS

We have the full line of ATARI personal computers and systems, including Models 400 and 800. The computers, accessories, and hardware are brand new, in factory sealed cartons, and carry a full factory warranty.
Most models are in stock for immediate delivery (usually within 7-10 days), and a price quote is as near as your phone. So if you're looking for the **best prices in the U.S.A.**, for microcomputers and accessories, call Computer Discount of America, Inc., West Milford, New Jersey 07480. 201-728-8080. **NO TAX ON OUT-OF-STATE SHIPMENTS.**

TOLL FREE 800-526-5313

✓372

Computer Discount of America

Authorized TRS-80 dealer, store B-282.

✓See List of Advertisers on page 306

if He'd used select tm it wouldn't have taken seven days

Learn SELECT* in just 90 minutes. A whole new word processing software concept that kicks the coded key habit and frees you from complicated instruction manuals. *SELECT* is fast. *SELECT* is logical. With single key mnemonics, you'll use dozens of commands that instantly access the rich capabilities of this system. There's nothing like it.

Simply hit "C" and you'll be ready to Create a document.
Key "I" and you'll be in the Insert mode.
Key "M" and Move entire blocks of text . . . and key dozens more.

That's all there is to it. You'll get all that word processing software promises . . . plus a few surprises.

SELECT with SUPERSPELL.* The only microcomputer software with an integrated spelling dictionary. To proof your text all you do, of course, is to key "S". *SUPERSPELL* with its 10,000 word dictionary scans your text at computer speed then displays and corrects all your typing errors. You can increase *SUPERSPELL*'s word power and customize the dictionary by adding new words, one at a time. Ask to see it today at your local dealer.

SELECT with SUPERSPELL . . . just a little byte more.TM

SELECT will run on any machine that uses CP/M or MP/M** or its derivatives. It needs 40K of RAM and two disk drives. Special version now available for Radio Shack Mod II*** and Apple II****.

*SELECT and SUPERSPELL are trademarks of Select Information Systems Inc.
**CP/M and MP/M are trademarks of Digital Research.
***A trademark of Tandy Corp.
****A trademark of Apple Computer Inc.

select ✓50
INFORMATION SYSTEMS 919 Sir Francis Drake Boulevard • Kentfield, California 94904 • (415) 459-4003

RAMTST

I wrote a machine language program to test the RAM in my system. The name of my program is RAMTST. RAMTST (Listing 2) is a machine language program written with the help of the Radio Shack Editor/Assembler (EDTASM). With all the comments that are in the source of the program, you will need a system of at least 32K to assemble it. The advantage of using EDTASM would be that you could compile the program to use any address you want to execute from. If you do not have EDTASM or 32K RAM, you could use T-BUG to inset the code into RAM, which might be a big job, as RAMTST has 1182 bytes of object code to type in.

The version of RAMTST I use is loaded into addresses 42E9H through 4787H. The program tests RAM locations 4788 to the top of memory. RAMTST is loaded like any other system tape, and loads in about 25 seconds. Type / (enter) after the program has loaded to begin execution.

RAMTST will first ask for the starting address of the location of RAM to be tested. If the location entered is below 4788 (hex), the program will respond with an error message. (The program will not allow you to kill it by writing over it in RAM.) If you respond with "*", the program will do an automatic phase that will find the top of memory without your help, and go on to the third prompt.

"Large scale integration has revolutionized the design of computers . . ."

The second prompt asks for the end address of memory that you want tested. The third prompt asks for how many repetitions of RAMTST you want. You can enter up to 65000 plus if you want, but it will take a while to execute. After all prompts are satisfied, the program will begin execution. In a system of 32K RAM, one repetition of RAMTST will take about 40 seconds.

What RAMTST Does

RAMTST will process through six phases. We will take a look at each phase in turn.

Phase one writes FF H into all bytes of RAM. It then writes OO H into every third RAM byte (Table 1). The upper left-hand corner of your screen will display the repetitions left to complete RAMTST. The right-hand corner will display the number of errors encountered. The middle of the screen will show that the program is running, as well as what the major byte is.

In phase one, the major byte would be FF H and the minor byte would be OO H. The program will also display what phase is currently processing, as well as whether it is writing out data or whether it is verifying data displayed as W for write and R for read

```
4580  11C03C    1805            LD   DE,DINFOM      ;POINT TO CRT
4583  ED532040  1810            LD   (CURSOR),DE   ;LOAD CURSOR
4587  21EA46    1815            LD   HL,BLANK      ;POINT TO BLANK
458A  CDA728    1820            CALL PRINT         ;DISPLAY
458D  11C03D    1825            LD   DE,DPROMP     ;GET LOCATION
4590  ED532040  1830            LD   (CURSOR),DE   ;LOAD CURSOR
4594  219146    1835            LD   HL,TEXT9      ;POINT TO TEXT
4597  CDA728    1840            CALL PRINT         ;DISPLAY
459A  E1        1845            POP  HL            ;GET ADDRESS
459B  C1        1850            POP  BC            ;GET BYTE
459C  C9        1855            RET                ;ERROR DISPLAYED RETURN
                1860 ;*****************************************************
                1865 ; PHASEP  DISPLAY CURRENT PROGRAM PHASE
                1870 ;*****************************************************
459D  C5        1885 PHASEP     PUSH BC            ;SAVE BC ON STACK
459E  C5        1890            PUSH BC            ;AGAIN
459F  218747    1895            LD   HL,PHASE      ;GET PHASE ADDRESS
45A2  34        1900            INC  (HL)          ;ADD 1 TO PHASE
45A3  7E        1905            LD   A,(HL)        ;PUT PHASE INTO A
45A4  FE07      1910            CP   7             ;IS IT = TO 7?
45A6  2002      1915            JR   NZ,PHASEDP    ;NO-DISPLAY IT
45A8  3601      1920            LD   (HL),1        ;RESET TO 1 IF YES
45AA  11953C    1925 PHASDP     LD   DE,DPHASE     ;GET LOCATION
45AD  ED532040  1930            LD   (CURSOR),DE   ;LOAD CURSOR
45B1  212647    1935            LD   HL,TEXT13     ;POINT TO TEXT
45B4  CDA728    1940            CALL PRINT         ;DISPLAY IT
45B7  218747    1945            LD   HL,PHASE      ;POINT TO PHASE
45BA  4E        1950            LD   C,(HL)        ;LOAD PHASE INTO C
45BB  219B3C    1955            LD   HL,DPHASD     ;POINT TO CRT
45BE  CD2C44    1960            CALL BXASH         ;CONVERT TO ASCII AND DSP
45C1  C1        1965            POP  BC            ;GET BACK BYTE
45C2  21A93C    1970            LD   HL,DMAJBT     ;POINT TO CRT
45C5  CD2C44    1975            CALL BXASH         ;CONVERT AND DISPLAY
45C8  C1        1980            POP  BC            ;GET BYTE
45C9  C9        1985            RET                ;RETURN-PHASE DISPLAYED
                1990 ;
                1995 ;*****************************************************
                2000 ;*   TEXTS AND STOREAGE LOCATIIONS
                2005 ;*****************************************************
                2010 ;
45CA  52414D20  2015 TEXT1      DEFM 'RAM TEST'
45CE  54455354
45D2  00        2020            DEFB 00H
45D3  42592052  2025 TEXT2      DEFM 'BY ROBERT D. RANDALL  AUG. 31, 1980'
45D7  4F424552
45DB  5420442E
45DF  2052414E
45E3  44414C4C
45E7  20202041
45EB  55472E33
45EF  312C2031
45F3  393830
45F6  00        2030            DEFB 00H
45F7  454E5445  2035 TEXT3      DEFM 'ENTER *,OR STARTING ADDRESS (XXXXH) '
45FB  5220202A
45FF  202C4F52
4603  20535441
4607  5254494E
460B  47204144
460F  44524553
4613  53202858
4617  58585848
461B  2920
461D  00        2040            DEFB 00H
461E  454E5445  2045 TEXT4      DEFM 'ENTER ENDING ADDRESS (XXXXH) '
4622  5220454E
4626  44494E47
462A  20414444
462E  52455353
4632  20285858
4636  58584829
463A  20
463B  00        2050            DEFB 00H
463C  454E5445  2055 TEXT5      DEFM 'ENTER REPETITIONS OF TEST (XXXXH) '
4640  52205245
4644  50455449
4648  54494F4E
464C  53204F46
4650  20544553
4654  54202858
4658  58585848
465C  2920
465E  00        2060            DEFB 00H
465F  434F554E  2065 TEXT6      DEFM 'COUNT='
4663  543D
4665  00        2070            DEFB 00H
4666  4552524F  2075 TEXT7      DEFM 'ERRORS='
466A  52533D
466D  00        2080            DEFB 00H
466E  54455354  2085 TEXT8      DEFM 'TESTING LOCATIONS=    H THRU     H'
4672  494E4720
4676  4C4F4341
467A  54494F4E
467E  533D2020
4682  20204820
```

Program continues

or verify. At the bottom of the display, the program will display the area of RAM being tested. This area will be the one that was entered through prompts from the program or the address that was located by the auto function of RAMTST.

If an error should be encountered, a display will show you the location where the error occurred, as well as what the contents of the byte are and what the contents should have been. You will then be prompted as to whether you want to continue with the test or end RAMTST and return to BASIC mode. If you wish to continue testing, the error counter will update itself to show the error.

If every byte checks out in phase one, the program will switch the major and minor byte and fill all locations as in phase one. This will be phase two.

In phase three, the major byte becomes FF H and the minor bytes becomes OO H. All core positions are loaded with the major byte, but this time the first minor byte will be loaded one byte sooner than in phase one (Table 1). Every third byte is then loaded in turn with the minor byte, as before.

Phase four switches the major and minor bytes and loads as in phase three. See Table 1 for what happens in phases five and six.

If an error is found and you decide not to continue with the test and respond NO to the prompt, you will return to BASIC mode. If you wish to return to RAMTST, from BASIC, you may do so by typing SYSTEM and / (enter). Caution: this will only work if you have not disturbed RAMTST in memory. If RAMTST has found a bad location in memory, you must find out which one of the RAM chips is at fault.

In the TRS-80, each bit in a byte will be found in one RAM chip. The most significant four bits of a byte are in RAM chips Z13, Z14, Z20, and Z15, and RAM chips Z19, Z18, Z16, and Z17 contain the least significant four bits. As an example, assume that byte 32781 contains A3 H or 10100011 binary. At location 32781 of each of the eight RAM chips, the bit would be as follows: Z13 would be a one, Z14 would be a zero, Z20 would be a one, and Z15 would be a zero. Of the least significant four bits, Z19 and Z18 would have a zero, and Z16 and Z17 would both have a one at the position.

Knowing where there is a possible RAM problem and how the RAM chips store data, it should not be much of a problem discovering which of the RAM chips is at fault. You can use a program such as Listing 3 to find any stuck bits.

Listing 3 will display what it was trying to write and what the byte contains. From this you should be able to determine the bit at fault. In other words, if the program was trying to write 04 H (00000100 B) and the byte contained OO H (00000000 B), this would point to RAM chip Z18. Substituting a good RAM chip at this socket and running the program again without errors, will assure you theat you have found the bad RAM chip. ■

```
4686  54485255
468A  20202020
468E  2048
4690  00        2090            DEFB 00H
4691  52414D20 2095 TEXT9      DEFM 'RAM TEST IS NOW EXECUTING'
4695  54455354
4699  20495320
469D  4E4F5720
46A1  45584543
46A5  5554494E
46A9  47
46AA  00        2100            DEFB 00H
46AB  52414D20 2105 TEXT10     DEFM 'RAM TEST IS NOW COMPLETE'
46AF  54455354
46BE  20495320
46B7  4E4F5720
46BB  434F4D50
46BF  4C455445
46BF  4C455445
46CB  00        2110            DEFB 00H
46C4  2B455252 2115 TEXT11     DEFM '+ERROR+ LOCATION='
46CB  4F522B20
46CC  4C4F4341
46D0  54494F4E
46D4  3D22
46D6  00        2120            DEFB 00H
46D7  48202843 2125 TEXT12     DEFM 'H (CONTINUE? Y-N) '
46DB  4F4E5449
46DF  4E55453F
46E3  20592D4E
46E7  2920
46E9  00        2130            DEFB 00H
46EA  20202020 2135 BLANK      DEFM '
46EF  20202020
46F3  20202020
46F4  20202020
46F8  20202020
46FC  20202020
4700  20202020
4704  20202020
4708  20202020
470C  20202020
4710  20202020
4714  20202020
4718  20202020
471C  20202020
4720  20202020
4724  20
4725  00        2140            DEFB 00H
4726  50484153 2145 TEXT13     DEFM 'PHASE=  MAJOR BYTE='
472A  453D2020
472E  204D414A
4732  4F522042
4736  5954453D
473A  00        2150            DEFB 00H
473B  434F4E54 2155 TEXT14     DEFM 'CONTENTS=   SHOULD HAVE BEEN='
473F  454E5453
4743  3D202020
4747  53484F55
474B  4C442048
474F  41564520
4753  4245454E
4757  3D
4758  00        2160            DEFB 00H
4759  2A434155 2165 TEXT15     DEFM '*CAUTION* ADDRESS TOO LOW, RE-INPUT'
475D  54494F4E
4761  2A204144
4765  44524553
4769  5320544F
476D  4F204C4F
4771  572C2052
4775  452D494E
4779  505554
477C  00        2170            DEFB 00H
477D  0000      2175 START      DEFW 0000H
477F  0000      2180 END        DEFW 0000H
4781  8847      2185 AUTOLD     DEFW 4788H
4783  0000      2190 COUNT      DEFW 0000H
4785  00        2195 ERROR      DEFB 00H
4786  00        2200 CNTPOS     DEFB 00H
4787  00        2205 PHASE      DEFB 00H
42E9            2210 END        42E9H
0000 TOTAL ERRORS
```

Listing 3.

```
1  CLS:INPUT"ENTER RAM ADDRESS(XXXXXD(";L:D = '
5  POKE L,0:IF PEAK(L)<>0 THEN PRINT"BYTE";L;"WON'T CLEAR TO ZERO, IT CONTAINS";PEAK(L):STOP
10 FOR X = TO 8:POKE L,D:IF PEAK(L) D THEN 20
15 D = D*2:IF D>128 THEN PRINT"TEST COMPLETE, NO ERRORS":STOP:ELSE NEXT X
20 PRINT"ERROR AT";L;" SHOULD'VE CONTAINED";D;" BUT IT CONTAINED";PEEK(L);"INSTEAD":STOP
```

FMG CORPORATION NOW CARRIES GRAHAM-DORIAN & PEACHTREE SOFTWARE

FMG CORPORATION

VISA® master charge THE INTERBANK CARD

P.O. Box 16020
Fort Worth, Texas
76133
(817) 294-2510

✓12

M-530

All FMG Software Products Include All Necessary Manuals

NEW VERSATILITY For Your TRS-80

CP/M®2

CONTROL PROGRAM FOR MICROCOMPUTERS ENABLING YOU TO RUN SOFTWARE PUBLISHED FOR CP/M 1.4 ON THE TRS-80

CP/M is considered the industry standard disk operating system because it gives you the hardware-independent interface you need to make your computer work for you. CP/M 2.0 is the latest in the evolution of a proven reliable and efficient software system. FMG CORPORATION NOW OFFERS THE CP/M 2.0 FOR THE TRS-80.

It features an enhanced upward compatible file system and powerful new random access capabilities. The CP/M 2.0 from FMG provides the ability to run software published for the CP/M system, on the TRS-80 Model II. From minidisks, floppy disks, all the way to high-capacity hard disks, the flexibility of CP/M 2.0 makes it a truly universal operating system. The package includes an 8" system disk, editor, assembler and debugger for the TRS-80

Available in Format A, B, C, G only . . . **$200/$25**

MP/M™

MULTI-PROGRAMMING MONITOR

NEW INDUSTRY STANDARD

A deluxe operating system that provides big computer facilities at small computer prices. MP/M is a monitor program which operates with your microcomputer to provide multi-terminal access with multi-programming at each terminal. Best of all, it's CP/M compatible which means you can run a wide variety or programming languages, applications packages, and development software.

You can run simultaneous editors, program translators, and background printer spoolers. Or you can use MP/M for data entry or data-base access from remote terminals. Or you can use MP/M real-time features to monitor an assembly line and automatically schedule programs for execution throughout the day. MP/M makes an excellent focal point for a cluster of connected microcomputers. The possibilities are limitless.

(Format B) . . . . . **$450/$35**
(Format G) . . . . . **$300/$35**

*CP/M and MP/M are trademarks of Digital Research.
Z80 is a trademark of Zilog, Inc.
TRS-80 is a trademark of Tandy Corp.
Pascal/M is a trademark of Sorcim.

· MICROPRO INTERNATIONAL

SOFTWARE WITH MANUAL / MANUAL/ALONE

(M) **SUPER-SORT I** — Sort, merge, extract utility as absolute executable program or linkable module in Microsoft format. Sorts fixed or variable records with data in binary, BCD, Packed Decimal, EBCDIC, ASCII, floating & fixed point, exponential, field justified, etc. Even variable number of fields per record! **$225/$25**

SUPER-SORT II — Above available as absolute program only . . . . . **$175/$25**

SUPER-SORT III — As II without SELECT/EXCLUDE . . . . . **$125/$25**

WORD-STAR — Menu driven visual word processing system for use with standard terminals. Text formatting performed on screen. Facilities for text paginate, page number, justify, center and underscore. User can print one document while simultaneously editing a second. Edit facilities include global search and replace. Read/Write to other text files, block move, etc. Requires CRT terminal with addressable cursor positioning . . . . . **$495/$40**

WORD-STAR Customization Notes — For sophisticated users who do not have one of the many standard terminal or printer configurations in the distribution version of WORD-STAR . . . . . **NA/$95**

WORD-MASTER Text Editor — In one mode has superset of CP/M's ED commands including global searching and replacing, forwards and backwards in file in video mode, provides full screen editor for users with serial addressable-cursor terminal . . . . . **$150/$25**

FLOPPY SAVER — Protection for center holes of 5" and 8" floppy disks. Only 1 needed per diskette. Kit contains centering post, pressure tool and tough 7 mil mylar reinforcing rings for 25 diskettes.
5", Kit **$14.95**
5", Rings only **$7.95**
8", Kit **$16.95**
8", Rings only **$8.95**

HEAD CLEANING DISKETTE—Cleans the drive Read/Write head in 30 seconds. Diskette absorbs loose oxide particles, fingerprints, and other foreign particles that might hinder the performance of the drive head. Lasts at least 3 months with daily use.
8" **$32.00**
5¼" **$30.00**

(M) · **DESPOOL** — Allows flexibility and efficiency. (Disk file printing can be accomplished while simultaneously using the computer for other tasks) Slower printers do not tie up the computer. Requires 32K minimum . . . . . **$75/$10**

(M) · **SCREEN EDIT** — Text editor for program entry — allows user the ability to see entries as they are being made. Has command which enables user to move the viewed position of the file anywhere within the current data file OR add information anywhere in the file. Requires 16K minimum . . . . . **$125/$25**
(Also available in TRS DOS format.
Specify model or TRS-80)

(M) · **MAC** — Disk-based, powerful macro assembler utilizes Standard Intel Mnemonics. Includes macro processor.
The CP/M 8080 Macro Assembler reads assembly language statement from a diskette file and produces an Intel "HEX" format object file on the disk suitable for processing in the TRS-CP/M environment. Requires 32K minimum and CP/M . . . . . **$100/$25**

(M) · **ZSID** — Efficient and reliable program testing system for Z80 microcomputers. Capabilities include traceback and histogram facilities. Allows real time break points.
ZSID is a symbolic debugger which expands upon the features of the TRS-CP/M standard debugger, providing greatly enhanced facilities for assembly language program check-out. Requires 32K minimum and CP/M . . . . . **$99/$25**

(T) **MAIL LIST** — Mailing list maintenance package. No sorting required to print normal address labels in zip code sequence. Supports new larger zip code. Sorts and selects on multiple fields. Labels may be printed in user selectable formats. Includes sort and select utilities **$300/$35**

· PEACHTREE SOFTWARE SYSTEMS

GENERAL LEDGER — Records details of all financial transactions. Generates a balance sheet and an income statement. Flexible and adaptable design for both small businesses and firms performing client writeup services. Produces reports as follows: Trial Balance, Transaction Registers, Balance Sheet, Prior Year Comparative Balance Sheet, Income Statement, Prior Year Comparative Income Statement and Department Income Statements. Interactive with other PEACHTREE accounting packages. Supplied in source code for Microsoft BASIC . . . . . **$990/$30**

(T) **ACCOUNTS PAYABLE** — Tracks current and aged payables and incorporates a check writing feature. Maintains a complete vendor file with information on purchase orders and discount terms as well as active account status. Produces reports as follows: Open Voucher Report, Accounts Payable Aging Report and Cash Requirements. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft. BASIC . . . . . **$990/$30**

(T) **ACCOUNTS RECEIVABLE** — Generates invoice register and complete monthly statements. Tracks current and aged receivables. Maintains customer file including credit information and account status. The current status of any customer account is instantly available. Produces reports as follows: Aged Accounts Receivable, Invoice Register, Payment and Adjustment Register and Customer Account Status Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC . . **$990/$30**

(T) **PAYROLL** — Prepares payroll for hourly, salaried and commissioned employees. Generates monthly, quarterly and annual returns. Prepares employee W-2's. Includes tables for federal withholding and FICA as well as withholding for all 50 states plus up to 20 cities from pre-computed or user generated tables. Will print checks, Payroll Register, Monthly Summary and Unemployment Tax Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC . . . . . **$990/$30**

(T) **INVENTORY** — Maintains detailed information on each inventory item including part number, description, unit of measure, vendor and reorder data, item activity and complete information on current item costs, pricing and sales. Produces reports as follows: Physical Inventory Worksheet, Inventory Price List, Departmental Summary Report, Inventory Status Report, The Reorder Report and the Period-to-Date and Year-to-Date reports. Supplied in source code for Microsoft BASIC . . . . . **$1,190/$30**

(T) **MAILING ADDRESS** — Keeps track of name and address information and allows the selective printing of this information in the form of mailing lists or address labels. Allows the user to tailor the system to his own particular requirements. User-defined format and print-out system uses a special format file which tells programs how to print the mailing list or address labels. Standard format files are included with system. Automatic sorting of data uses indexed file management routines which allow the name and address information to be sequentially retrieved and printed without file sorting. Supplied in source code for Microsoft BASIC . . . . . **$790/$30**

· GRAHAM-DORIAN SOFTWARE SYSTEMS

(T) **GENERAL LEDGER** — An on-line system; no batching is required. Entries to other GRAHAM-DORIAN accounting packages are automatically posted. User establishes customized C.O.A. Provides transaction register, record of journal entries, trial balances and monthly closings. Keeps 14 month history and provides comparison of current year with previous year. Requires CBASIC-2. Supplied in source . . . **$995/$35**

(T) **ACCOUNTS PAYABLE** — Maintains vendor list and check register. Performs cash flow analysis. Flexible — writes checks to specific vendor for certain invoices or can make partial payments. Automatically posts to GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source . . . . . **$995/$35**

(T) **ACCOUNTS RECEIVABLE** — Creates trial balance reports, prepares statements, ages accounts and records invoices. Provides complete information describing customer payment activity. Receipts can be posted to different ledger accounts. Entries automatically update GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source . . . . . **$995/$35**

(T) **PAYROLL SYSTEM** — Maintains employee master file. Computes payroll withholding for FICA, Federal and State taxes. Prints payroll register, checks, quarterly reports and W-2 forms. Can generate ad hoc reports and employee form letters with mail labels. Requires CBASIC-2. Supplied in source . . . . . **$590/$35**

(T) **INVENTORY SYSTEM** — Captures stock levels, costs, sources, sales, ages, turnover, markup, etc. Transaction information may be entered for reporting by salesman, type of sale, date of sale, etc. Reports available both for accounting and decision making. Requires CBASIC-2. Supplied in source . . . **$590/$35**

(T) **JOB COSTING** — Designed for general contractors. To be used interactively with other GRAHAM-DORIAN accounting packages for tracking and analysing expenses. User establishes customized cost categories and job phases. Permits comparison of actual versus estimated costs. Automatically updates GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source **$995/$35**

Sample Program Disk For Each Graham-Dorian Business Package. Specify Package **$45**

The sale of each proprietary software package conveys a license for use on one system only.

Prices F.O.B. Fort Worth, Tex. Shipping, handling and C.O.D. charges extra.

· MICROSOFT PRODUCTS

(M) **BASIC-80** — Disk Extended BASIC, ANSI compatible with long variable names, WHILE/WEND, chaining, variable length file records . . . . . **$350/$25**

(M) **BASIC COMPILER** — Language compatible with BASIC-80 and 3-10 times faster execution. Produces standard Microsoft relocatable binary output. Includes MACRO-80. Also linkable to FORTRAN-80 or COBOL-80 code modules . . . . . **$395/$25**

(M) **FORTRAN-80** — ANSI 66 (except for COMPLEX) plus many extensions. Includes relocatable object compiler, linking loader, library with manager. Also includes MACRO-80 (see below) . . . . . **$500/$25**

(M) **COBOL-80** — Level 1 ANSI '74 standard COBOL plus most of Level 2. Full sequential, relative, and indexed file support with variable file names. STRING, UNSTRING, COMPUTE, VARYING/UNTIL, EXTEND, CALL, COPY, SEARCH, 3-dimensional arrays, compound and abbreviated conditions, nested IF. Powerful interactive screen-handling extensions. Includes compatible assembler, linking loader, and relocatable library manager as described under MACRO-80 . . . . . **$750/$25**

(M) **MACRO-80** — 8080/Z80 Macro Assembler. Intel and Zilog mnemonics supported. Relocatable linkable output. Loader, Library Manager and Cross Reference List utilities included . . . . . **$150/$25**

(T) **XMACRO-86** — 8086 cross assembler. All Macro and utility features of MACRO-80 package. Mnemonics slightly modified from Intel ASM86. Compatibility data sheet available . . . . . **$300/$25**

(T) **PASCAL/M*** — Compiler generates P code from extended language, implementation of standard PASCAL. Supports overlay structure through additional procedure calls and the SEGMENT procedure type. Provides convenient string handling capability with the added variable type STRING. Untyped files allow memory image I/O. Requires 56K CP/M . . . **$150/$20**

(T) **PASCAL/Z** — Z80 native code PASCAL compiler. Produces optimized, ROMable re-entrant code. All interfacing to CP/M is through the support library. The package includes compiler, Microsoft Compatible relocating assembler and linker, and source for all library modules. Variant records, strings and direct I/O are supported. Requires 56K CP/M and Z80 CPU. . . . . **$395/$25**

(M) **PASCAL/MT** — Subset of standard PASCAL. Generates ROMable 8080 machine code. Symbolic debugger included. Supports interrupt procedures, CP/M file I/O and assembly language interface. Real variables can be BCD, software floating point, or AMD 9511 hardware floating point. Version 3 includes Enumeration and Record data types. Manual explains BASIC to PASCAL conversion. Source for the run-time package requires Digital Research's MAC. Requires 32K . . . . . **$250/$30**

(M) **CBASIC-2** Disk Extended BASIC — Non-interactive BASIC with pseudo-code compiler and run-time interpreter. Supports full file control, chaining, integer and extended precision variables, etc. . . . . **$110/$15**

(M) **BSTAM** — Utility to link one computer to another also equipped with BSTAM. Allows file transfers at full data speed (no conversion to hex), with CRC block control check for very reliable error detection and automatic retry. We use it! It's great! Full wildcard expansion to send ★ COM, etc. 9600 baud with wire. 300 baud with phone connection. **Both** ends need one. Standard and Ⓜ versions can talk to one another. . . . . **$150/$5**

(M) (T) **SELECTOR III-C2** — Data Base Processor to create and maintain multi Key data bases. Prints formatted sorted reports with numerical summaries or mailing labels. Comes with sample applications, including Sales Activity, Inventory, Payables, Receivables, Check Register, and Client/Patient Appointments, etc. Requires CBASIC-2. Supplied in source . . **$349/$20**

GLECTOR — General Ledger option to SELECTOR III-C2. Interactive system provides for customized COA. Unique chart of transaction types insure proper double entry bookkeeping. Generates balance sheets, P&L statements and journals. Two year record allows for statement of changes in financial position report. Supplied in source. Requires SELECTOR III-C2, CBASIC-2 and 52K system . . . . . **$250/$25**

(M) **TEXTWRITER III** — Text formatter to justify and paginate letters and other documents. Special features include insertion of text during execution from other disk files or console, permitting recipe documents to be created from linked fragments on other files. Has facilities for sorted index, table of contents and footnote insertions. Ideal for contracts, manuals, etc. Now compatible with Electric Pencil* prepared files. . . . . **$125/$20**

ORDERS MUST SPECIFY DISK SYSTEMS AND FORMATS:

FORMATS AVAILABLE:
(A) TRS-80 Model I (M) Keys Only
(B) TRS-80 Model II
(C) TRS-80 Model III (M) Keys Only
(D) HEATHKIT H89 (M) Keys Only
(E) NORTH STAR
(F) SUPER BRAIN QD
(G) STANDARD UNIMPLEMENTED

(M) Modified version available for use with CPM as implemented on Heath and TRS-80 Model I computers.

(T) For all (T) items listed above, the recommended system configuration consists of 48K CPM 2 full dize disk drives. 24 x 80 CRT and 132 column printer.

FMG's LIBRARY:

PASCAL USER MANUAL & REPORT
(2nd) Edition by K. Jensen and N. Wirth

- **Tutorial Manual and Concise Reference Report for Both Programmers and Implementors**
- **Includes Helpful Examples to Demonstrate the Various Features of PASCAL**

The book consists of two parts: the user manual and the revised report. The manual is directed to those who have some familiarity with computer programming and who wish to get acquainted with the PASCAL language. The report defines standard PASCAL, which constitutes a common base between various implementations of the language.

Stock No. #B21 — **Price** $9.95

PASCAL PRIMER Problem Solving

This book has three major goals:
- **To introduce all aspects of the programming and problem solving process (includes problem specification and organization, algorithms, coding, debugging, testing, documentation and maintenance);**
- **To teach good programming style and how to produce a high quality finished product; and**
- **To teach the syntax of the PASCAL programming language.**

Numerous examples are employed throughout the text. PASCAL is used as a vehicle to teach various aspects of programming techniques.

Stock No. #B24 — **Price** $18.95

Microcomputer Problem Solving Using Pascal
by Kenneth L. Bowles

- **A Book Designed for Both College Courses AND Individual Self-Study**
- **Ideal for use with UCSD Pascal**
- **Includes Extensions to Standard PASCAL**

This book is designed both for introductory courses in computer problem solving at the freshman and sophomore college level, and for individual self-study. It includes many examples and actually executable programs. It includes information on the necessary functions and procedures for handling graphics and strings.

Stock No. #B22 — **Price** $14.95

BEGINNER'S MANUAL FOR UCSD PASCAL SYSTEM

- **An Enlightening Introduction to UCSD PASCAL**
- **Demonstrates How to Use the UCSD PASCAL System and How to Program in PASCAL**
- **Includes Many Practical Examples of PASCAL Programs**

This book is intended to be used as an introduction and reference manual for people just beginning to use the UCSD Pascal Software System. Whether you have never used a computer before or whether you are an experienced programmer who is unfamiliar with UCSD PASCAL, this book will provide a relatively easy, yet thorough, introduction to UCSD PASCAL.

Stock No. #B25 — **Price** $11.95

PROGRAMING IN PASCAL
by Peter Grogono

- **An Excellent Introduction to One of the Fastest Growing Programming Languages Today**
- **Sections on Procedures and Files PLUS a Chapter on Dynamic Data Structures such as Trees and Linked Lists**

The text is arranged as a tutorial, containing both examples and exercises to increase reader proficiency in PASCAL. Concepts are illustrated by examples, ranging from the Tower of Hanoi problem to circumscribing a circle about a triangle. PROGRAMMING IN PASCAL is sure to hold the reader's interest.

Stock No. #B23 — **Price** $14.95

UCSD Reference Book

- **A Reference Guide to the Complete UCSD PASCAL System**
- **Includes Information on Compiler Basic, Assembler and Editor**
- **Lists Actual P-Machine Codes**

This reference book can be a valuable and time-saving guide to thorough information on the UCSD PASCAL system. The easy-to-read manual provides fast access to pertinent data.

Stock No. #B26 — **Price** $25.00

✓See List of Advertisers on page 306

A BASIC to FORTRAN conversion utility of limited effectiveness.

FORTRANslator

FORTRANslator
The Management
Aledo, TX
$29.95

Richard C. McGarvey
221 Hirschfield Drive
Williamsville, NY 14221

I am going to break some writing rules and start this review with a warning rather than a catchy introduction: If you are not a capable FORTRAN programmer or at least a very dedicated learner, skip this article and the FORTRANslator utility. However, if you are a dedicated learner with a good supply of FORTRAN manuals and a good printer you might be interested.

The reason for this warning is that the FORTRANslator utility, despite what you might expect, does not really translate BASIC to FORTRAN. In fact, the resulting translation is totally useless to a programmer without a good FORTRAN vocabulary.

I read about the FORTRANslator utility in the New Products section of *80 Microcomputing*, and it sounded too good to be true. The description promised that a program could be written and debugged in BASIC and then translated to FORTRAN. Most of my programs are written in BASIC, and I wanted to learn how to rewrite them in FORTRAN, but the work involved was prohibitive. It seemed as though FORTRANslator would be the answer.

The program consists of one disk with the BATRAN/CMD program and one page of documentation. I rushed to the computer, whipped out some short BASIC programs and started to work.

The Small Problems

I always expect problems with new programs and I was not disappointed this time. It appeared that the one page letter included all the instructions I needed to operate the program. It also contained a list of what the translator did and did not do. It was certainly straight-forward.

The first step is to save the BASIC program in ASCII format (SAVE"TEST/BAS" ,A). Then go to DOS, run BATRAN/CMD and answer the questions that the translator asks. They are: SAVE ON DISK?—if YES—ENTER FILESPEC. PRINTER ON LINE?—an answer of YES, produces a hard copy of the translation. From this point on the translator takes over and each ASCII line is supposed to be evaluated and placed into FORTRAN format. The result should be close to FORTRAN, but here is where the problems start.

```
00100 C   Convert Fahrenheit to Centigrade
00200     Integer F
00300     Write(5,5)
00400 5   Format(33H Fahrenheit Centigrade)
00500     DO 20 F = 20,65,5
00600     C = 5./9.*(F – 32)
00700     Write(5,10)F,C
00800 10  Format(12X,I2,11X,F6.3)
00900 20  Continue
01000     End
```

Figure 1.

```
10 REM CONVERT FAHRENHEIT TO CENTIGRADE
20 DEFINT F
30 PRINTTAB(5)"FAHRENHEIT   CENTIGRADE
40 FORF = 20T065STEPS
50 C = (5/9)*(F – 32)
60 PRINTTAB(8)F;"          ";C
70 NEXTF
80 END
```

Figure 2. Basic Version

The instructions indicate what kinds of problems may be encountered, however, they give no suggestions as to how to solve them. Of course, if you don't know FORTRAN already, there is no chance in hell that you will be able to solve them. If the author of the translator utility had taken the time to work out the more common problems, (such as string handling) and include the solutions as examples, the beginner might have a chance. It also would have helped if the documentation described what you could expect as a result of translation.

So, documentation is a problem which wouldn't be too bad if that was all, but it's not. There are problems with the printer output. The resulting translation requires extensive editing and a line printer is a must. There was a warning to that effect in the *80* ad as well as in the documentation. They aren't kidding. FORTRAN is longer than BASIC and much more particular about the format of instruction lines. A printout on which you can edit before you actually edit the program is indispensable.

The printout procedure has some flaws. The first part of the printout is a cross reference of BASIC calls that will have to be altered. It is helpful, but when there is no output the heading is printed and a whole page is wasted.

The second page is a printout of the arrays used, broken down by GOTO array and

subroutine arrays. This is also necessary since FORTRAN does not use subroutines as BASIC does, and they must all be moved to the end of the FORTRAN program. Again, when there is a short list or no list, the page is headed and wasted.

The third part of the printout is the FORTRAN program. It is neat and clean and there is plenty of room in which to write editing notes. There is no problem here—at least, there is no problem with the printout.However, the content is another story.

Difficulties with Translation

OK! So I've been a little picky so far. It gets worse. To start, I will use the FORTRAN do loop as an example of problems that occur in the translation. The program claims to produce do loops; seeing the problems that exist with them gives a clear view of the troubles that occur with FORTRAN conventions that are not produced by the translator.

A do loop is the FORTRAN version of a BASIC for-next loop and is used in the same way. Here is an example of the do loop, the for-next loop and the do loop that is produced by the translator.

Proper Do Loop	For Next Loop	Translator Do Loop
Do 10 J = 1, 1000	ForJ = TO1000	DoJ = TO1000
Step1	Step1	Step1
Step2	Step2	Step2
.	.	.
.	.	.
.	.	.
10 Continue	NextJ	ContinueJ

In the correct do loop, do 10 means "Do the steps between the do and the continue labeled 10." The variable J will equal the values 1 to 1000, as in a for/next loop. Arrays are used between the do/continue as array(J), which will increment from J = 1 to J = 1000 as the loop progresses.

The translator do loop is not correct! It must be edited to correct format. Also, the correct continue must be labeled. In fact, all that the translator does is change the word "for" to "do", the word "next" to "continue", and add the variable name, resulting in continueJ. If the original for/next loop has a subroutine branch nested in the loop, it will be lost and the logical flow of the program must be adjusted or the FORTRAN program will not run correctly.

This occurs throughout the translation. BASIC input PRINT, LPRINT, PUT and GET are all handled by FORTRAN's READ and WRITE. Each READ or WRITE statement is followed by the name of the device to be read or written to and the label of the format line that tells FORTRAN what to READ or WRITE and how. The form is READ(d,1) where d is the assigned device number (ie., 2 for printer, 5 for keyboard and video, 6 for disk) and 1 is the label of the format line to be used. The translator does not assign the correct device number but does assign a format line label. The format line will have to be corrected for the type of data and device. This is difficult if you don't know exactly which kind of data to expect. Also, LPRINTS will be translated as LWRITE(d,1) and have to be edited. I imagine that the L was left on so the programmer knows that when editing, the destination device intended was the printer. Without the correct device number in the WRITE statement there would be no way to know which device was intended without checking program logic. Disk READ and WRITE are useless as they come out of the translator and must be completely reworked and formatted.

Another important consideration is compatibility with the FORTRAN compiler. The translator produces text in FORTRAN form. It inserts C lines (REM in BASIC) and it prints in an easy to read form with room for manual editing on the page. The disk output is the same text that is on the printer—*it will not work in the TRS-80 (Microsoft) FORTRAN compiler.*

```
100  C
200  C-----------------------------------------
300  C Name:
400  C Purpose:
500  C Calling Sequence:
600  C Input Assignments:
700  C Output Arguments:
800  C Description:
900  C Devices:
1000 C Notes:
1100 C
1200 C-----------------------------------------
1300 C
1400 C Undefined Variables:
          I,J,K,L,M = Integer. Others Real
1500 C
1600      Integer
1700 C
1800      Real
1900 C
2000      Double Precision
2100 C
2200      Logical
2300 C
2400      External
2500 C
2600      Dimension
2700 C
2800      Common
2900 C
3000      Equivilance
3100 C
3200      Data
3300 C
3400 C REM Convert Fahrenheit to Centigrade
3500            Defint F
3600 C
3700            Write(3, 110)
3800      110       Format (PC, "Fahrenheit   Centigrade)
3900 C
4000            DOF = 20T065,5
4100            C = (5/9)*(F - 32)
4200 C
4300            Write(3, 111) ";C
4400      111       Format (PC,"     )
4500 C
4600            ContinueF
4700 End
```

Figure 3. Translator Version

In FORTRAN, programming is done in columns and each column or group of columns has a specific use. When a program is translated, loaded into the TRS-80 FORTRAN editor and edited into proper FORTRAN syntax, the compiler will still generate errors for every C line, every label line and every statement line. This is due to improper column arrangement in the translation and requires more editing, and spacing the lines so that columns are properly aligned.

Note the program in Fig. 1. This is an example program from the Radio Shack (Microsoft) FORTRAN package. It is correctly columned and can be compiled with no errors. This program generates the centigrade equivalent for fahrenheit values from 20 to 65 with increments of five degrees. Fig. 2 is a BASIC program that will output the data in the FORTRAN example right down to the format of video display. Now look at Fig. 3; this is the translation of the BASIC program in Fig. 2. Note that the format of the line numbers are different from that in the FORTRAN editor. Also, the (comment) lines are not spaced the same. This makes the entire translation incompatible with the FORTRAN editor.

Not only is the format wrong but the statement lines are error-filled. Note line 4100 in Fig. 3. This is the formula line for converting fahrenheit to centigrade. The translator has duplicated the formula exactly as it appears in BASIC. FORTRAN formulae are different! Look at Fig. 1, line 600. That is correct FORTRAN! Now look at line 4400 in Fig. 3. This is the format line for the data output. Nothing there! If you look at Fig. 1, line 800 you will see correct formatting. It is easy to see that a programmer who is not familiar with FORTRAN would have no use for this translation.

There are many more problems. Text lines are cut off, write lines become doubled with text format lines, and there are still more. Even if we assume that you can get a working program out of the translator —there is still one last warning to consider. The translator does not approach efficient use of FORTRAN. Microsoft FORTRAN is about 60 times faster than Disk BASIC. This estimate is based on a program I wrote to check the time difference. The benefit of faster FORTRAN is lost if you do not use it efficiently.

Not All Bad

The translator does have some value. It does aid in reducing typing time. And it provides a FORTRAN format for the BASIC program that is a skeleton starting point. It aids in following the logic of a BASIC program that you are rewriting. Also, it is helpful if you are learning FORTRAN (have some background first or you will be lost).

One final word. I have only pointed out the major problems that occurred in the translation of short BASIC programs. You can see that the problems are extensive and would be insurmountable to a programmer without FORTRAN knowledge. I shudder to think what problems may occur in the translation of an extensive BASIC program. If you write the original BASIC program carefully, some of the translation problems I have mentioned may be eliminated. ■

THE ORIGINAL MAGAZINE FOR OWNERS OF THE TRS-80™* MICROCOMPUTER

* TRS-80™ IS A TRADEMARK OF TANDY CORP.

SOFTWARE FOR TRS-80™ OWNERS

H & E COMPUTRONICS INC.

MONTHLY NEWSMAGAZINE FOR TRS-80™ OWNERS

MONTHLY NEWSMAGAZINE

Practical Support For Model I, II & III

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS

. . . . AND MORE

NOW IN OUR 4th YEAR

PROGRAMS AND ARTICLES PUBLISHED IN RECENT ISSUES INCLUDE THE FOLLOWING:

- FINCALC - A COMPLETE FINANCIAL APPLICATIONS PACKAGE
- INFORMATION SYSTEM REVIEW
- STATISTICAL COMBINATIONS
- PASCAL'S TRIANGLE
- ASSEMBLY LANGUAGE FOR BEGINNERS
- DISK FILES
- MOD-III REVIEW
- KEYBOARD THUNDER AND LIGHTING EXPLAINED
- DOS COMMANDS IN LEVEL II
- PROBABILITY CURVE GENERATOR
- CALCULATOR SIMULATIONS
- THE MEGABYTE GAP
- STOCKS AND BONDS
- BUDGET ANALYSIS (FOR BUSINESS AND HOME)
- NEWDOS/80 REVIEW
- DUTCHING - THE HORSE SYSTEM THAT CAN'T LOSE
- A SIMULATED GOLF GAME
- CONTINUOUS FORM SOURCES
- TAX/SAVER REVIEW

. . . . . AND MORE

FREE* WITH YOUR SUBSCRIPTION OR RENEWAL

FINCALC A Complete Financial Analysis Package Used To Calculate Markup, Margin, Annuities, Compound Interest, Nominal And Effective Rates, Sinking Funds, Mortgage Calculations, Future Value, Savings and Insurance, Percentage Difference Between Two Numbers, Amortization Schedule and More . . . . . .

SEND FOR OUR NEW 64 PAGE SOFTWARE CATALOG (INCLUDING LISTINGS OF HUNDREDS OF TRS-80™ PROGRAMS AVAILABLE ON CASSETTE AND DISKETTE). $2.00 OR **FREE** WITH EACH SUBSCRIPTIONS OR SAMPLE ISSUE

*** All programs are supplied on cassette (add $3 for Diskette Version - add $5 for modified Mod-II Version).**

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

ONE YEAR SUBSCRIPTION $24 .....
TWO YEAR SUBSCRIPTION $48 .....
SAMPLE OF LATEST ISSUE $ 4 .....
START MY SUBSCRIPTION WITH ISSUE.....
(#1 - July 1978 • #12 - June 1979 • #24 - July 1980 • #30 - January 1981)
NEW SUBSCRIPTION..... RENEWAL.....

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____ NAME _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

***** ADD $12/YEAR (CANADA, MEXICO) - ADD $24/YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO *****

H & E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

* TRS-80™ is a trademark of the Radio Shack Division of Tandy Corporation

Currently Available

MOD-II PROGRAMS

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all TRSDOS Software*
★ *Add $3.00 for shipping in UPS Areas*
★ *Add $4.00 for C.O.D. or NON-UPS Areas*
★ *Add $5.00 outside U.S.A., Canada & Mexico*
★ *We will match any bonafide advertised price in any of the Major Computer Magazines*

ALL SOFTWARE LISTED HERE WORKS WITH TRSDOS*

(1) ELECTRIC PENCIL (Michael Shrayer Software)... Complete word processor with extensive editing and printer formatting features....$325 (STANDARD TRSDOS VERSION)...$350 (DIABLO, NEC OR QUME TRSDOS VERSION).

(2) GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL, INVOICING AND PAYROLL (Small Business Systems Group)...an extensive business system for the serious user...can be used one module at a time or as a co-ordinated system...$225...per module...$1299 for the complete system.

(3) GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL AND PAYROLL (Compumax)...a complete user oriented business system...can be used one module at a time or as a coordinated system...$140 per module... $995 for the complete system.

(4) MOD-II UTILITY PACKAGE (Racet Computes)... adds important utilities to TRSDOS...copy files selectively...faster and more accurate file copying... repair bad directories...displays sorted directory of all files on 1 to 4 disk drives...SUPERZAP...change disk ID...and more...$150.

(5) ADVENTURE #1-#9 (Scott Adams - Adventure International)...a series of games formally only available on the large computers...your goal is to work your way through a maze of obstacles in order to recover a secret treasure or complete a mission...the package includes all 9 Adventures written by Scott Adams...$99.95.

(6) GSF (Racet Computers)...Generalized Subroutine Facility...a series of super fast machine language utilities that can be called from a BASIC program (no machine language knowledge required)...sorts 1000 items in under 5 seconds...allows PEEK and POKE statements...move data blocks...compress and uncompress data...works under TRSDOS...$50.

(7) DSM (Racet Computes)...Disk Sort Merge...sorts and merges large multiple diskette files on a 1 to 4 drive system...NOT AN IN MEMORY SORT...can actually alphabetize (or any other type of sort) 4 disk drives worth of data...sorts one complete disk of information in 10 minutes...information is provided to use DSM with the RS MAILING PROGRAM...works under TRSDOS...$150.

(8) RSM (Small Systems Software)...a machine language monitor and disassembler...can be used to see and modify memory or disk sectors...contains all the commands found on the Model-I version plus some additional commands for the MOD-II...works under TRSDOS...$39.95.

(9) BLINK BASIC LINK FACILITY (Racet Computes)... Link from one BASIC program to another saving all variables...chain programs without losing variables ...$50.

(10) BASIC CROSS REFERENCE UTILITY (Racet Computes)...lists all variables and strings used in a program (with the line numbers in which they appear) ...lists all GOTO's and GOSUB's (with the line numbers in which they appear)...searches for any specific variables or strings (with the line number in which they appear)...$50.

(11) DEVELOPMENT PACKAGE (Racet Computes)... SUPERZAP (to see, print or change any byte on a diskette)...Disassembler and MOD-II interface to the **MICROSOFT EDITOR ASSEMBLER PLUS** including uploading services and patches for Disk I/O..assemble directly into memory...save all or portions of source to disk...dynamic debug facility (ZBUG)...entended editor commands...$125.

(12) HARD/SOFT DISK SYSTEM (Racet Computes)... The software essential to interface any of the popular large hard disk drives...completely compatible with your existing software and files...allows up to 20 megabytes of storage (and larger)...directory expandable to handle thousands of files...$400.

(13) CAMEO HARD DISK DRIVE CONTROLLER... coming soon (November 1?)

(14) HARD DISK DRIVES...coming soon (Nov. 1?).

(15) H & E COMPUTRONICS, INC. SHARE-A-PROGRAM DISKETTE #1...works under TRSDOS...a collection of programs written by MOD-II owners... programs include data base management...a word processor...mail system...mortgage calculations... checkbook register...and many others...$8 (add $3 postage outside of the United States, Canada and Mexico)...FREE if you send us a diskette containing a program that can be added to the SHARE-A-PROGRAM DISKETTE.

(16) WABASH CERTIFIED DISKETTES...$39.95 (per box of 10).

(17) FLIP SORT DISKETTE STORAGE TRAY...Stores 50 diskettes...comes complete with index-dividers, tilt plates and adjustable spacing...$44.95.

(18) MASTER PAC 100...100 essential programs... BUSINESS...PERSONAL FINANCE...STATISTICS... MATH...GAMBLING...GAMES...includes 125 page manual and 2 diskettes...$99.95.

(19) BUSINESS PAC 100...100 essential business programs...INVENTORY CONTROL...PAYROLL... BOOKKEEPING SYSTEM...STOCK CALCULATIONS...CHECKBOOK MAINTENANCE...ACCOUNTS RECEIVABLE...ACCOUNTS PAYABLE... includes 125 page manual and two diskettes...$149.95.

(20) EDITOR ASSEMBLER (Galactic Software Ltd.)... the first user oriented Editor Assembler for the MODEL II and was designed to utilize all the features of the MODEL II. It includes innovative features for ease of coding and debugging and complete documentation (over 120 pages)...works under TRSDOS ...$229.00.

(21) BASIC COMPILER (Microsoft)...changes your source programs into machine language...increases program execution by 3-10 times...$395.

(22) MAIL/FILE SYSTEM from Galactic Software Ltd. stores 2,500 names per disk. No sorting time is required since the file is automatically sorted by first and last name plus Zip Code on input. Retrieve by any combination of 19 user codes. Supports an 11 digit alphanumerica Zip. Supports a message line. Comes complete with user-oriented documentation (100-page manual). Allows for company name and individual of a company and complete phone number (and extension)...works under TRSDOS...$199.00

(23) INCOME TAX PAC...Professional income tax package...most forms and schedules...output to video or line printer...automatic memory storage of all information...data can be loaded from diskette, changed and edited...built in error checking...$199.95.

(24) COMPUTER GAMES (SBSG)...Mean Checker Machine, Star-Trek III, Concentration, Treasure Hunt, Banco, Dog Star Adventure...$74.95.

ALL PROGRAMS LISTED HERE REQUIRE CP/M*

(1) CP/M (Lifeboat Associates).....an alternative operating system for the **MOD-II** that allows **MOD-II** owners to use any of the hundreds of programs available under **CP/M**...$170.

(2) CP/M HANDBOOK...(Sybex)...a step-by-step guide to **CP/M**...takes the reader through each of the **CP/M** commands...numberous sample programs... practical hints...reference tables...$13.95.

(3) GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL, AND PAYROLL (Peachtree Software)...requires CP/M and MICROSOFT BASIC...professional business systems...turn key operation...can be used as single modules or as a coordinated system...$500 per module...$2500 for the complete system.

(4) WORD-STAR...The ultimate word processor...a menu driven word processing system that can be used with any printer. All standard word processing commands are included...plus many unique commands only found on WORD STAR...requires CP/M ...$495.

(5) MAIL LIST MERGE...An add on package that allows the user to send form letters (created on WORD-STAR) to any compiled mailing list (using any CP/M based MAIL program such as the PEACHTREE MAIL PROGRAM)...requires CP/M, WORD STAR and andy CP/M based mail program...$150.

(6) SELECTOR III (Micro-Ap)...complete data management system...user defined fields and codes... manages any list defined by the user...includes additional modules for simplified inventory control, accounts receivable and accounts payable...requires CBASIC-2...$295.

(7) SELECTOR IV (Micro-Ap)...the ultimate data management system...all features use the **SELECTOR III** plus...data file format conversions...full page report formatter...computations...global search and replace ...hard disk compatible...data/text merging...$550.

(8) GLECTOR (Micro-Ap)...add on package to the **SELECTOR**...general ledger that allows the user to define a customized chart of accounts...$350.

(9) CBASIC-2...a non-interactive BASIC used for many programs that run under **CP/M**...allows user to make more efficient use of disk files...eliminates the use of most line number references...require on such programs as the **SELECTOR**...$120.

(10) MICROSOFT BASIC...an enhanced version of the **MICROSOFT BASIC** found on **TRSDOS**...adds commands such as chaining (allows the user to LOAD and RUN a new program without losing the variables currently in memory)...long variable length file records, WHILE/WEND and others...can be used with the BASIC COMPILER to speed up programs (3-10 times faster execution)...$325.

(11) MASTER TAX (CPAids)...professional tax preparation program...prepares schedules, A, B, C, D, E, F, G, R/RP, SE, TC, ES and forms 2106, 2119, 2210, 3468, 3903, 2441, 4625, 4726, 4797, 4972, 5695 and 6521. Printing can be on readily available pre-printed continuous forms, on overlays, or on computer generated IRS approved forms. Maintains clint history files...interactive with CP/Aids General Ledger...$995.

(12) GENERAL LEDGER II (CPAids)...designed for CPA's...stores complete 12 month detailed history of transactions...generates financial statements, depreciation, loan amortizations, journals, trial balances, statements of changes in financial position, and compilation letters...includes payroll system with automating posting to general ledgers...prints payroll register, W2's and payroll checks...$450.

(13) ELECTRIC PENCIL (Michael Shrayer Software) ...Complete word processor with extensive editing and printer formatting features...$275 (Standard printer version)...$300 (DIABLO, NEC or QUME version).

(14) BASIC COMPILER (Microsoft)...changes your source programs into machine language...increases program execution by 3-10 times...$395.

* (CP/M IS A REGISTERED TRADEMARK OF DIGITAL RESEARCH)

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

NEW TOLL-FREE
ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

NEW!!!
MOD-II NEWSLETTER
$12/year (or 12 issues)

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

* TRS-80™ is a trademark of the Radio Shack Division of Tandy Corporation

100 SUPER PROGRAMS

MASTER PAC 100

2nd EDITION (COMPLETELY REVISED)

FOR YOUR TRS-80™ LEVEL II MICROCOMPUTER

ALL ON CASSETTE OR DISKETTE

BUSINESS AND PERSONAL FINANCE

1. CHECKBOOK MAINTENANCE
2. TIME FOR MONEY TO DOUBLE
3. FEDERAL FICA & WITHHOLDING TAX
3. COMPUTATIONS
4. HOME BUDGET ANALYSIS
5. ANNUITY COMPUTATION
6. UNIT PRICING
7. CHANGE FROM PURCHASE
8. NEBS CHECK PRINTER
9. DAYS BETWEEN DATES
10. MORTGAGE AMORTIZATION TABLE
11. INVENTORY CONTROL
12. PORTFOLIO VALUE COMPUTATIONS
13. VALUE OF A SHARE OF STOCK
14. SALES RECORD KEEPING SYSTEM
15. FUTURE VALUE OF AN INVESTMENT
16. EFFECTIVE INTEREST RATE (LOAN)
17. PRESENT VALUE OF A FUTURE AMOUNT
18. RATE OF RETURN-VARIABLE INFLOW
19. RATE OF RETURN-CONSTANT INFLOW
20. REGULAR WITHDRAWAL FROM INVESTMENT
21. STRAIGHT LINE DEPRECIATION
22. SUM OF DIGITS DEPRECIATION
23. DECLINING BALANCE DEPRECIATION
24. BREAK EVEN ANALYSIS
25. SALVAGE VALUE OF INVESTMENT
26. PAYMENT ON A LOAN
27. FUTURE SALES PROJECTIONS
28. CREDIT CARD FILE
29. ECONOMIC ORDER QUANTITY (EOQ) INVENTORY MODEL
30. VALUE OF HOUSE CONTENTS
31. TEXT EDITOR
32. MONTHLY CALENDAR
33. DAY OF WEEK
34. CASH FLOW VS. DEPRECIATION
35. COMPLETE MAIL SYSTEM
36. INTEREST RATE ON A LEASE

BUSINESS

PERSONAL FINANCE

STATISTICS AND MATHEMATICS

37. RANDOM SAMPLE SELECTION
38. ANGLO-METIC CONVERSION
39. MEAN, STANDARD DEVIATION, MAXIMUM AND MINIMUM
40. SIMPLE LINEAR REGRESSION
41. MULTIPLE REGRESSION ANALYSIS
42. GEOMETRIC REGRESSION
43. EXPONENTIAL REGRESSION
44. SIMPLE MOVING AVERAGE
45. SIMPLE T-TEST
46. CHI-SQUARE TEST
47. NORMAL PROBABILITIES
48. BINOMIAL PROBABILITY
49. POISSON PROBABILITY
50. MATRIX ADDITION AND SUBTRACTION
51. MATRIX TRANSPOSE
52. MATRIX INVERSE
53. MATRIX MULTIPLICATION
54. SOLUTION OF SIMULTANEOUS EQUATIONS
55. QUADRATIC FORMULA
56. LINEAR EQUATION SOLUTIONS
57. ROOT HALF INTERVAL SEARCH
58. ROOTS OF POLYNOMIALS
59. ROOTS-NEWTON'S METHODS
60. PRIME FACTORS OF INTEGER
61. LEAST COMMON DENOMINATOR
62. RADIAN-DEGREE CONVERSION
63. NUMERICAL INTEGRATION

STATISTICS

MATH

UTILITIES

64. QUICK SORT ROUTINE
65. PROGRAM STORAGE INDEX
66. MULTIPLE CHOICE QUIZ BUILDER
67. FORM LETTER WRITER
68. SHELL SORT
69. CASSETTE LABEL MAKER
70. CODES MESSAGES
71. MERGE TWO FILES
72. SORT WITH REPLACEMENT

GRAPHICS

73. DRAWS BAR GRAPH
74. DRAWS HISTOGRAM
75. MOVING BANNER DISPLAY

GAMBLING AND GAMES

76. RANDOM SPORTS QUIZ
77. GOVERNMENT QUIZ
78. HORSE RACE
79. MAGIC SQUARE
80. ARITHMETIC TEACHER
81. HIGH LOW GAMBLE
82. UNSCRAMBLE LETTERS
83. HANGMAN
84. GAME OF NIM
85. RUSSIAN ROULETTE
86. ROULETTE GAME
87. ONE-ARMED BANDIT
88. HIT THE TARGET
89. WALKING DRUNK
90. STATE CAPITAL QUIZ
91. TIC-TAC-TOE
92. DICE GAME
93. LUNAR LANDAR GAME
94. BIORHYTHM
95. HORSE SELECTOR (CLASS CALCULATOR)
96. RANDOM DICE ROLL
97. RANDOM ROULETTE ROLL
98. RANDOM CARD DEALER
99. GUESS THE NUMBER
100. WHITE OUT SCREEN

GAMBLING

INCLUDES 110 PAGE USER MANUAL

GUARANTEED SATISFACTION
30-DAY MONEY BACK GUARANTEE ON ALL SOFTWARE

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

PLEASE SEND ME:

☐ MASTER PAC 100 CASSETTE VERSION $59.95
☐ MASTER PAC 100 DISKETTE VERSION $59.95
☐ MASTER PAC 100 (TRS-80 MODEL II VERSION) $99.95

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all Software*

CREDIT CARD NUMBER ..... EXP. DATE.....

SIGNATURE.....

NAME .....

ADDRESS ..... CITY..... STATE ..... ZIP .....

*** ADD $3.00 FOR SHIPPING IN UPS AREAS • ADD $4.00 FOR C.O.D. OR NON-UPS AREAS • ADD $5.00 OUTSIDE U.S.A, CANADA & MEXICO ***

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

NEW

★ All orders processed within 24-Hours
★ 30-Day money back guarantee on all Software

BUSINESS PAC 100

100 Ready-To-Run Business Programs

(ON CASSETTE OR DISKETTE).....Includes 110 Page Users Manual.....5 Cassettes (Or Diskettes)
Inventory Control.....Payroll.....Bookkeeping System.....Stock Calculations.....
Checkbook Maintenance.....Accounts Receivable.....Accounts Payable.....

BUSINESS 100 PROGRAM LIST

1	RULE78	Interest Apportionment by Rule of the 78's
2	ANNU1	Annuity computation program
3	DATE	Time between dates
4	DAYYEAR	Day of year a particular date falls on
5	LEASEINT	Interest rate on lease
6	BREAKEVN	Breakeven analysis
7	DEPRSL	Straightline depreciation
8	DEPRSY	Sum of the digits depreciation
9	DEPRDB	Declining balance depreciation
10	DEPRDDB	Double declining balance depreciation
11	TAXDEP	Cash flow vs. depreciation tables
12	CHECK2	Prints NEBS checks along with daily register
13	CHECKBK1	Checkbook maintenance program
14	MORTGAGE/A	Mortgage amortization table
15	MULTMON	Computes time needed for money to double, triple, etc.
16	SALVAGE	Determines salvage value of an investment
17	RRVARIN	Rate of return on investment with variable inflows
18	RRCONST	Rate of return on investment with constant inflows
19	EFFECT	Effective interest rate of a loan
20	FVAL	Future value of an investment (compound interest)
21	PVAL	Present value of a future amount
22	LOANPAY	Amount of payment on a loan
23	REGWITH	Equal withdrawals from investment to leave 0 over
24	SIMPDISK	Simple discount analysis
25	DATEVAL	Equivalent & nonequivalent dated values for oblig.
26	ANNUDEF	Present value of deferred annuities
27	MARKUP	% Markup analysis for items
28	SINKFUND	Sinking fund amortization program
29	BONDVAL	Value of a bond
30	DEPLETE	Depletion analysis
31	BLACKSH	Black Scholes options analysis
32	STOCVAL1	Expected return on stock via discounts dividends
33	WARVAL	Value of a warrant
34	BONDVAL2	Value of a bond
35	EPSEST	Estimate of future earnings per share for company
36	BETAALPH	Computes alpha and beta variables for stock
37	SHARPE1	Portfolio selection model-i.e. what stocks to hold
38	OPTWRITE	Option writing computations
39	RTVAL	Value of a right
40	EXPVAL	Expected value analysis
41	BAYES	Bayesian decisions
42	VALPRINF	Value of perfect information
43	VALADINF	Value of additional information
44	UTILITY	Derives utility function
45	SIMPLEX	Linear programming solution by simplex method
46	TRANS	Transportation method for linear programming
47	EOQ	Economic order quantity inventory model
48	QUEUE1	Single server queueing (waiting line) model
49	CVP	Cost-volume-profit analysis
50	CONDPROF	Conditional profit tables
51	OPTLOSS	Opportunity loss tables
52	FQUOQ	Fixed quantity economic order quantity model
NAME	**DESCRIPTION**	
53	FQEOWSH	As above but with shortages permitted
54	FQEOQPB	As above but with quantity price breaks
55	QUEUECB	Cost-benefit waiting line analysis
56	NCFANAL	Net cash-flow analysis for simple investment
57	PROFIND	Profitability index of a project
58	CAP1	Cap. Asset Pr. Model analysis of project
59	WACC	Weighted average cost of capital
60	COMPBAL	True rate on loan with compensating bal. required
61	DISCBAL	True rate on discounted loan
62	MERGANAL	Merger analysis computations
63	FINRAT	Financial ratios for a firm
64	NPV	Net present value of project
65	PRINDLAS	Laspeyres price index
66	PRINDPA	Paasche price index
67	SEASIND	Constructs seasonal quantity indices for company
68	TIMETR	Time series analysis linear trend
69	TIMEMOV	Time series analysis moving average trend
70	FUPRINF	Future price estimation with inflation
71	MAILPAC	Mailing list system
72	LETWRT	Letter writing system-links with MAILPAC
73	SORT3	Sorts list of names
74	LABEL1	Shipping label maker
75	LABEL2	Name label maker
76	BUSBUD	DOME business bookkeeping system
77	TIMECLCK	Computes weeks total hours from timeclock info.
78	ACCTPAY	In memory accounts payable system-storage permitted
79	INVOICE	Generate invoice on screen and print on printer
80	INVENT2	In memory inventory control system
81	TELDIR	Computerized telephone directory
82	TIMUSAN	Time use analysis
83	ASSIGN	Use of assignment algorithm for optimal job assign.
84	ACCTREC	In memory accounts receivable system-storage ok
85	TERMSPAY	Compares 3 methods of repayment of loans
86	PAYNET	Computes gross pay required for given net
87	SELLPR	Computes selling price for given after tax amount
88	ARBCOMP	Arbitrage computations
89	DEPRSF	Sinking fund depreciation
90	UPSZONE	Finds UPS zones from zip code
91	ENVELOPE	Types envelope including return address
92	AUTOEXP	Automobile expense analysis
93	INSFILE	Insurance policy file
94	PAYROLL2	In memory payroll system
95	DILANAL	Dilution analysis
96	LOANAFFD	Loan amount a borrower can afford
97	RENTPRCH	Purchase price for rental property
98	SALELEAS	Sale-leaseback analysis
99	RRCONVBD	Investor's rate of return on convertable bond
100	PORTVAL9	Stock market portfolio storage-valuation program

☐ **CASSETTE VERSION** **$99.95**
☐ **DISKETTE VERSION** **$99.95**
☐ **TRS-80* MODEL II VERSION** **$149.95**

ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 OUTSIDE U.S.A, CANADA & MEXICO

NEW TOLL-FREE ORDER LINE (OUTSIDE OF N.Y. STATE) (800) 431-2818

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

VISA

24 HOUR ORDER LINE (914) 425-1535

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

SMALL BUSINESS SYSTEMS GROUP

COORDINATED BUSINESS SYSTEMS

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all Software*
★ *Add $3.00 for shipping in UPS Areas*
★ *Add $4.00 for C.O.D. or NON-UPS Areas*
★ *Add $5.00 outside U.S.A., Canada & Mexico*

FACTS ABOUT THE S.B.S.G. BUSINESS PACKAGES

1. **S.B.S.G.** is a sophisticated Business Software System designed for the serious businessman.
2. Each of the **S.B.S.G. Business Modules** may be purchased separately...or you may purchase the entire coordinated business system.
3. Modules purchased separately do not coordinate with the General Ledger (although for the standard **S.B.S.G.** fee, the user may upgrade his individual modules for the coordinated system).
4. Foolproof, Step-By-Step procedures are supplied, planned and documented for the **First-Time Computer User.** All programs are self-explanatory, telling the user what is required at every step.
5. Programs are written in **BASIC** and the source code listing is supplied for those users who decide to modify the original system.
6. A complete users manual is supplied with each module.
7. Demo Data diskettes are supplied with sample data.
8. **S.B.S.G.** has an In-House staff that can answer questions and problems related to the proper use of the **S.B.S.G. Business System** (on the telephone or through the mail).
9. First-Time Computer Owners Note-Instructions are provided for entering state payroll withholding tables. There is an additional charge if you prefer to have **S.B.S.G. Programmers** insert the correct data.
10. Minimum system requirement is 2-drives to run any single module.
11. Minimum system requirement is 3-drives to run the coordinated business system (AR-AP-GL) or (AR-AP-GL with PAYROLL).
12. Minimum system requirement is 4-drives to run the extended coordinated system (AR-AP-GL-PR and INVENTORY/INVOICING).
13. The **A. OSBORNE & ASSOCIATES** business manuals are provided **FREE** with each order (they may be purchased separately at $20 per manual).
14. The INVENTORY and INVOICING modules are original programs written by **S.B.S.G.**
15. Each module can be purchased as independent modules to run on a 2 or more drive system except INVOICING.
16. Memory requirement is 48K for the MODEL-I and 64K for the MODEL-II.
17. All **S.B.S.G. BUSINESS SYSTEMS** may be upgraded up to 4-disk drives. No data is ever lost during an upgrade. There is a standard **S.B.S.G.** charge for all upgrades.

ACCOUNTS PAYABLE

The accounts payable system receives data concerning purchases from suppliers and produces checks in payment of outstanding invoices. In addition, it produces cash management reports. This system aids in tight financial control over all cash disbursements of the business. Several reports are available and supply information needed for the analysis of payments, expenses, purchases and cash requirements. All A/P data feeds General Ledger so that data is entered into the system just once. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding many larger systems).

CAPABILITIES:

★ menu driven; easy to use; full screen prompting and cursor control
★ invoice oriented; everything revolves around the invoice; handles new invoice or credit memo or debit memo
★ invoce information recorded; invoice #, description, buyer, check register #, invoice date, age date, amount of invoice, discount (in %), freight, tax ($), total payable
★ transaction print and file maintenance procedures insure accuracy
★ flexible check calculation procedure; allows checks to be calculated for a set of vendors-or-for specific vendors
★ program prints your checks; contiguous computer checks with your company letterhead can be purchased from SBSG
★ reports include (samples on back):
  - open item listing/closed item listing - both detail and summary
  - debit memo listing/credit memo listing
  - aging
  - check register report (to give an audit trail of checks printed)
  - vendor listing and vendor activity (activity of the whole year)
★ fully linked to GENERAL LEDGER; each invoice can be distributed to as many as five (5) different GL accounts; system automatically posts to cash and A/P accounts

ACCOUNTS RECEIVABLE

The objective of a computerized A/R system is to prepare accurate and timeley monthly statements to credit customers. Management can generate information required to control the amount of credit extended and the collection of money owed in order to maximize profitable credit sales while minimizing losses from bad debts. The programs composing this system were developed 5 years ago, especially for small businesses using the Wang Microcomputer. They have been tested in many environments since then. Each module can be used stand alone or can feed General Ledger for a fully integrated system.

CAPABILITIES:

★ menu driven; easy to use; full screen prompting and cursor control
★ invoice oriented; invoices can be entered before ready for billing, when ready for billing, after billing or after paid
★ allows entry of new invoice, credit memo, debit memo, or change/delete invoice
★ allows for progress payment
★ transaction information includes:
  - type of A/R transaction
  - customer P.O. #
  - description of P.O.
  - billing date
  - general ledger account number
  - invoice amount
  - shipping/transportation charges
  - tax charges
  - payment
  - progress payment information
  - transaction print & file maintenance procedures insure accuracy
★ customer statements printed; computer statements with your company letterhead can be purchased from SBSG
★ reports include: (samples on back)
  - listing of invoices not yet billed
  - open items (unpaid invoices)
  - closed items (paid invoices)
  - aging
★ fully linked to General Ledger; will post to applicable accounts; debit A/R, credits account you specify

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

PAYROLL

Payroll invoices many complex calculations and the production of reports and documents, many of which are required by government agencies. It is an ideal candidate for the computer. With this Payroll system in-house, you can promptly and accurately pay your employees and generate accruate documents/reports to management, employees, and appropriate government agencies concerning earnings, taxes, and other deductions. The package has been converted to the TRS-80™ and is now a well documented, op-line, interactive, micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES:

★ performs all necessary payroll tasks including:
- file maintenance, pay data entry and verification
- computation of pay and deduction amounts
- printing of reports and checks

★ can handle salaried and hourly employees
★ employees can receive:
- hourly or salary wage
- vacation pay
- holiday pay
- piecework pay
- overtime pay

★ employees can be paid using any combination of pay types (except, hourly cannot receive salary and salary cannot receive hourly)
★ special non-taxable or taxable lump sums can be paid regularly or one time (bonus, reimbursements, etc)
★ health and welfare deductions can be automatically calculated for each employee
★ earnings-to-date are accumulated and added to permanent records; taxes are computed and deducted: US income tax, Social Security tax, state income tax, other deductions (regular or one time)
★ paychecks are printed; computer checks with your company letterhead can be purchased from SBSG
★ calculations are accumulated for; employee pay history, 941A report, W-2 report, insurance report, absentee report
★ fully linked to General Ledger. Each employee's payroll information can be distributed to as many as (12) twelve different GL accounts; system automatically posts to cash account

INVENTORY CONTROL/INVOICING

★ **ISAM** (Indexed Sequential Access Method) eliminates the necessity for time consuming sort.
★ Pre-Allocated Files for IMMEDIATE update and inquiry capabilities.
★ Fast Disk storage and retrieval.
★ Inventory Master Record includes...class...SKU...Division...Retail...Cost...Beginning Balance...Period Sale Units...Period Receipts...On Order...On Hand...Minimum Reorder Point...Recommended Reorder Amount...Vendor Number...Period Sale Dollars...YTD Sale Units...YTD Sale Dollars.
★ Calculated and Displayed Formulas include...Gross Margin ($)...Gross Margin (%)...Gross Margin ROI (%)...Average Inventory Retail ($)...Average Inventory Cost ($)...Turn-Over (%).
★ Reports Generated include...Master File Listing...Class Description Listing...Transaction Audit Trail...Minimum Reorder Point by Vendor...Retail Price List...Retail & Cost Price List...Period Sales Report ...Year to Date Sales Report...Stock Status (Screen or printer output) ...Commission Report (for salesmen and buyers).
★ Transaction Types include...Sales, Vendor Receipts...Vendor Orders...Customer Returns...Vendor Returns...Transfer Stock.

GENERAL LEDGER

The General Ledger accounting system consolidates financial data from other accounting subsystems (A/R, A/P, Payroll, direct posting) in an accurate and timely manner. Major reports include the Income Statement and Balance Sheet and a "special" report designed by management. The beauty of this General Ledger system is that it is completely user formatted. You "customize" the account numbers, descriptions, and report formats to suit particular business requirements. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now a well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES:

★ more than 200 chart of accounts can be handled
★ account number structure is user defined and controlled
★ more than 1,750 transactions may be entered via:
- direct posting; done by hand; validated against the account file before acceptance
- external posting; generated by A/R, A/P, Payroll or any other user source

★ data is maintained and reported by:
- month
- quarter
- year
- previous three quarters

★ reports (samples on back) include:
- trial balances
- income statement
- balance sheet
- special accounts reports and more.....

★ user formats reports with the following designated as you wish:
- titles
- headings
- account numbers
- descriptions
- subtotals
- totals
- skip lines
- skip pages

★ up to eight levels of totals - fully user designated
★ menu driven; easy to use; full screen prompting and cursor control

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

24 HOUR ORDER LINE
(914) 425-1535

PRICING	MOD-1 VERSION	MOD-II VERSION	MOD-III VERSION
ACCOUNTS RECEIVABLE	$125	$225	$199.95
ACCOUNTS PAYABLE	$125	$225	$199.95
GENERAL LEDGER	$125	$225	$199.95
PAYROLL	$125	$225	$199.95
INVENTORY	$175	$275	$199.95
INVOICING	$150	$250	$199.95
COORDINATED INVENTORY/INVOICING ACCOUNTS RECEIVABLE	$449	$749	$599.95
COORDINATED AR-AP-GL	$375	$675	$599.95
COORDINATED AR-AP-GL with PAYROLL	$495	$899	$799.95
EXTENDED COORDINATED AR-AP-GL INVOICING/INVENTORY with PAYROLL	$799	$1299	$1199.95

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

MICROSOFT BASIC COMPILER

With TRS-80™ BASIC Compiler, your Level II programs will run at record speeds! Compiled programs execute an average of 3-10 times faster than programs run under Level II. Make extensive use of integer operations, and get speeds 20-30 times faster than the interpreter.

Best of all, BASIC Compiler does it with BASIC, the language you already know. By compiling the same source code that your current BASIC interprets, BASIC Compiler adds speed with a minimum of effort.

And you get more BASIC features to program with, since features of Microsoft's Version 5.0 BASIC interpreter are included in the package. Features like the WHILE...WEND statement, long variable names, variable length records, and the CALL statement make programming easier. An exclusive BASIC Compiler feature lets you call FORTRAN and machine language subroutines much more easily than in Level II.

Simply type in and debug your program as usual, using the BASIC interpreter. Then enter a command line telling the computer what to compile and what options to use.

Voila! Highly optimized, Z-80 machine code that your computer executes in a flash! Run it now or save it for later. Your compiled program can be saved on disk for direct execution every time.

Want to market your programs? Compiled versions are ideal for distribution. You distribute only the object code, not the source, so your genius stays fully protected.

BASIC Compiler runs on your TRS-80™ Model I with 48K and disk drive. The package includes BASIC Compiler, linking loader and BASIC library with complete documentation **$195.00**

1980 INCOME TAX PAC

Completely Revised - Latest Tax Tables - Fully Tested - Complete Manual and Documentation. The new version of the Income Tax Pacs are full of error catching codes making it impossible to make an error. Follow the simple Step By Step procedure that makes tax preparation simple.

INCOME TAX PAC A ..... **($19.95...Cassette)**
For Level II 16K Cassette Only
Does Form 1040 and 1040A
- Schedule A itemized deductions
- Schedule B interest and dividends
- Output to video display
- Schedule TC tax computation

INCOME TAX PAC B ..... **$49.95...Cassette or Diskette)**
For Level II 16K with or without printer...cassette or disk has all features of Income Tax Pac A **Plus** works with or without line printer.
- Formats Form 1040 and 1040A for standard tax forms
- Schedule C income from a personally owned business
- Form 2106 employee business expense

PROFESSIONAL INCOME TAX PAC C ..... **$99.95...Diskette**
For Level II 32K with disk and printer (optional)
Has all features of Income Tax Pac B **Plus** automatic memory storage for income tax preparers.
- 22 additional schedules and forms
- Formats forms for individual or tractor feed printing

MOD II CPA VERSION **$199.95**

GUARANTEED PROFIT **91%** **WINS PLACES SHOWS** **32%** **AVERAGE PROFIT AT ALL TRACKS-1978**

THE HORSE SELECTOR II (FLATS) (By Dr. Hal Davis **$50.00**
New simplified version of the original Horse Selector. The first Horse Selection System to actually calculate the estimated odds of each horse.
HIGHER PROFITS (OVER 100%) POSSIBLE THROUGH SELECTIVE BETTING ON:
- Rates each horse in 10 seconds.
- Easy to follow rules.
- Can be used with any Apple II Computer.
- 100% money back guarantee (returned for any reason).
- Uses 4 factors (speed rating, track variant, distance of the present race, distance of the last race).
- Using the above factors, the Horse Selector calculates the estimated odds. BET on horses whose actual payoff (from the Tote Board or Morning Lines) is higher than payoff based on estimated odds.
- Using the above factors, the Horse Selector calculates the estimated odds. BET on any selected horse with an estimated payoff (based on Tote Board or Morning Lines) higher than calculated payoff (based on Horse Selector II).
- Source listing for the TRS-80™, TI-59, HP-67, HP-41, Apple and BASIC Computers.
- No computer or calculator necessary (although a calculator would be helpful for the simple division used to calculate estimated odds).

FREE Dutching Tables allows betting on 2 or more horses with a guaranteed profit.

NEWDOS/80

A **New** enhanced NEWDOS for TRS-80™ Model I for the 1980's

Apparat Inc., announces the most powerful Disk Operating System for the TRS-80™. It has been designed for the sophisticated user and professional programmer who demands the ultimate in disk operating systems.

NEWDOS/80 is not meant to replace the present version of NEWDOS 2. 1 which satisfies most users, but is a carefully planned upward enhancement, which significantly extends NEWDOS 2. 1's capabilities. This new member to the Apparat NEWDOS' family is upward compatible with present NEWDOS 2. 1 and is supplied on Diskette, complete with enhanced NEWDOS + utility programs and documentation. Some of the NEWDOS/80 features are:
- New BASIC commands that supports with variable record lengths up to 4095 Bytes long.
- New BASIC commands that supports with variable record lengths up to 4095 Bytes long.
- Mix or match disk drives. Supports any track count from 18 to 80. Use 35, 40 or 77 track 5" mini disk drives or 8" disk drives, or any combination.
- A security boot-up for BASIC or machine code application programs. User never sees "DOSREADY" or "READY" and is unable to "BREAK", clear screen, or issue any direct BASIC statement including "LIST."
- New editing commands that allow program lines to be deleted from one location and moved to another or to allow the duplication of a program line with the deletion of the original.
- Enhanced and improved RENUMBER that allows relocation of subroutines.
- Powerful program chaining.
- Device hanging for routing to display and printer simultaneously.
- CDE function; simultaneous striking of the C, D and E keys will allow user to enter a mini-DOS to perform some DOS commands without disturbing the resident program.
- Upward compatible with NEWDOS 2. 1 and TRSDOS 2.3.
- Includes Superzap 3.0 and all Apparat 2.1 utilities.

..... **$149.00**

STOCK MARKET MONITOR

Galactic Software Ltd.

CASSETTE VERSION **$89.00**
DISK VERSION **$99.00**

1. The system is designed for the active "trader" not the "long term" investor, as the system is "technically" oriented.
2. For the TRS-80™ Model I, Level II, 16K or more. Available in both disk and tape versions.
3. Tracks user selected issues, in a technical system that reflects the issue's performance against the overall market.
4. Set up data is input by the user from the Standard and Poors stock guide or Value Line.
5. Daily issue data, "high", "low", "close" and "volume" are input from any newspaper containing this information.
6. Daily overall market, "volume" and "closing Dow" are also provided from a newspaper.
7. Volume and price changes of an issue, as they compare to volume an price changes of the overall market, are the basis of this system's analysis of the given issue.
8. Comparisons of the issue against itself are also done. This may allow the user to spot "unusual" activity on this issue.
9. Clear indications are given as to whether the issue is "out performing", "under performing" or "performing" with the market.
10. Complete video and printed output is provided.
11. This program is intended to be a guide to indications, and is not to be used as a sole recommendation to buy, sell or hold an issue. These decisions are the responsibility of the user and his brokerage.

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

master charge **24 HOUR ORDER LINE** VISA
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all Software*

ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 OUTSIDE U.S.A, CANADA & MEXICO

H&E COMPUTRONICS INC.

●●EVERYTHING FOR YOUR TRS-80™●●
MODEL III

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all TRSDOS Softwar*
★ *Add $2.00 for shipping in UPS Areas*
★ *Add $4.00 for C.O.D. or NON-UPS Areas*
★ *Add $5.00 outside U.S.A., Canada & Mexico*
★ *We will match any bonafide advertised price in any of the Major Computer Magazines*

* TRS-80 is a trademark of Tandy Corp.

(1) **GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, PAYROLL, INVENTORY CONTROL AND INVOICING** (Small Business Group).....an extensive business system for the serious user.....can be used one module at a time or as a coordinated system..... **$199.95** per module.....**$1199.95** for the complete system.*

(2) **MASTER PAC 100**.....100 essential programs.....BUSINESS.....PERSONAL FINANCE..... STATISTICS.....MATH.....GAMBLING.....GAMES.....includes 125 page manual and 5 diskettes **$59.95**

(3) **BUSINESS PAC 100**.....100 essential business programs.....INVENTORY CONTROL.....PAYROLL.....BOOKKEEPING SYSTEM.....STOCK CALCULATIONS.....CHECKBOOK MAINTENANCE.....ACCOUNTS RECEIVABLE.....ACCOUNTS PAYABLE.....includes 125 page manual and five diskettes **$99.95**

(4) **INFORMATION SYSTEM** (The Bottom Shelf).....An in-memory information system for small mailing lists, inventories (i.e. books, articles, records, program reference files).....Can be used for anything that you would use rolodex or index card files.....Up to ten user define fields..... Programmable printouts for rolodex cards, mailing labels, etc.....Will identify all records that contain a group of characters you've entered even if that group is in the middle of a line.....Sorts data base by any field **$49.50***

(5) **DATA MANAGER II** (The Bottom Shelf).....RANDOM ACCESS Disk based DATA MANAGEMENT SYSTEM (Similiar to INFORMATION SYSTEM above.....but RANDOM ACCESS STORAGE expands the amount of storage space available).....Used to replace index cards for medium sized mail lists, inventories, personnel records, sales prospects, etc.....Uses up to four disk drives on line.....Up to twenty user defined fields, programmable printouts for rolodex cards, etc.....will identify all records that contain a group of characters you've entered even if that group is in the middle of a line.....maintain up to 5 changeable presorted "key" files..... variable length random records (the smaller the record you define, the more records yu can store) **$99.95***

(6) **BUSINESS MAIL SYSTEM** (The Bottom Shelf).....Handles large mailing lists (up to 150,000 names).....supports 3 or 4 line addresses.....files automatically in zip code order, alphabetical within zip code.....formats for 1 to 4 across mailing labels.....supports quick disk location of single or multiple names.....meets all industry and postal standards.....numeric code fields included for printing selected records **$125.00***

(7) **ANALYSIS PAD** (The Bottom Shelf)..... A Columnar Calculator for financial analysis, line item budgeting, cost analysis, sales analysis and almost any financial function (and many statistical functions).....create matrixes of 29 × 39.....make all entries at one time either by row or column..... add, delete, move or switch columns and rows.....edit any data from full screen display.....add, subtract, multiply and divide one column by another and put results in designated column (up to six calculations can be made and placed in designated column).....define columns as constants.....save calculations and formulas on disk.....results can be printed in a variety of report formats **$99.95***

(8) **CHECKBOOK II** (The Bottom Shelf).....A complete in memory checkbook balancing and reconcilliation program.....five column keyboard input with 5 characters for check number, 16 for payee, 4 for code.....numerical sort routine **$49.50***

(9) **CHECK REGISTER ACCOUNTING SYSTEM** (The Bottom Shelf).....A complete random access checkbook system.....set and define up to 60 accounts with as many income accounts as you choose.....complete checkbook balancing and reconcilliation.....single entry input where transaction can be dispersed over several accounts.....enables user to make a 64-character note on each transaction.....print out your own check after data entry.....prints monthly summaries of each account with month and year-to-date totals.....create a suspense file to remind you of coming expenses.....Reports generated included Check Register (for any month), notes to Check Register, Income/Expense Distribution Report, Statement of Selected Accounts, Bank Reconcile Statement, Suspense File and Full Account Distribution Statement **$74.95***

(10) **LIBRARY 100** (The Bottom Shelf).....100 Programs on a broad range of topics.....Finance..... Education.....Graphics.....Home.....Games.....CASSETTE VERSION **$49.50**
DISK VERSION **$74.95**

(11) **ADVENTURE** (by Scott Adams).....A series of games (for ages 10-99).....wander through enchanted worlds seeking treasures..... 1. Adventureland.....2. Pirate's Adventure.....3. Mission Impossible Adventure.....4. Voodoo Castle.....5. The Count.....6. Strange Odyssey.....7. Mystery Fun House.....8. Pyramid of Doom.....9. Ghost Town.....(#1 and #2 recommended for the movie adventure).....Each adventure **$14.95** (jon cassette).....Diskette versions sold in groups of three at **$39.95** per three programs (#1 - #3, #4 - #6, #7 - #9).

(12) **HORSE SELECTOR II** (Dr. Hal Davis).....New simplified version of the original Horse Selector (for flats).....The first Horse Selection System to actually calculate the estimated offs for each horse.....easy to follow rules.....uses 4 factors (speed rating, track variant, distance of the present race, distance of the last race).....calculated estimated odds.....FREE DUTCHING TABLES allows betting on 2 or more horses with a guaranteed profit **$50.00**

(13) **MON-3 and MON-4** (Howe Software).....Powerful utility programs enabling you to interact directly with your **TRS-80** in MACHINE LANGUAGE.....The monitor comes with complete 40-page instruction manual making it useful for both the beginner and advanced programmer.... simple commands make it easy to use.....functions include DISPLAY, DISASSEMBLE, MOVE and COMPARE, SEARCH, MODIFY, RELOCATE, PRINT, READ and WRITE, UNLOAD, SAVE and READ, INPUT and OUTPUT, SEND and RECEIVE.....MON-3 **$39.95** (for cassette)..... MON-4 **$49.95** (for disk).

(14) **SMART TERMINAL** (Howe Software).....enables your TRS-80 to be used as a remote terminal to a time sharing computer system **$69.95**

(15) **FAST SORT** (Howe Software).....a series of machine-language subroutines to sort data from BASIC programs.....data may be alphabetic (string) or numeric.....easily interfaced with your BASIC programs (no machine language knowledge is necessary) **$9.95**

(16) **MAILING LIST** (Howe Software).....maintains mailing lists of over 1000 names.....commands allow adding, changing, deleting, and finding names. Sorting is done in machine language subroutine.....labels printed in 1, 2 or 3 columns **$69.95**

(17) **HOME BUDGET** (Howe Software).....combines the maintenance of your checkbook with analysis of your income, expenses and monthly bills. Handles data including bills, income deposits, checks and debits to your checking account, and cash expenses. Computes checkbook balance, list of unpaid bills, monthly and year-to-date summaries of income and expenses showing income tax deductions.....All output printed on video display or line printer.....comes with complete instructions manual **$49.95***

(18) **SMALL BUSINESS ACCOUNTING** (Howe Software).....Based on the DOME BOOKKEEPING SYSTEM.....keeps track of all income, expenditures and payroll for a small business of up to 16 employees.....income and expenditures can be entered on a daily, weekly or monthly basis..... computes monthly and year to date totals.....manual contains complete instrucitons for customization Cassette version **$29.95**.....Diskette version **$49.95**

(19) **REMODEL-PROLOAD** (Racet Computes).....Renumber program lines.....move statements from one part of a program to another **$34.95**

(20) **GSF** (Racet Computes).....Lightning fast in-memory machine language sort utility that can be made part of your BASIC progams without any machine language knowledge.....includes several other utilities to speed up your BASIC programs.....no machine knowledge necessary to use GSF in your BASIC programs **$30.00**

(21) **DOSORT** (Racet Computes).....includes **GSF** (above).....extends the in memory sort to sorts on multiple disk drives **$45.00***

(22) **COPSYS** (Racet Computes).....allows the user to make copies of machines language cassettes without any knowledge of machine language **$20.00**

(23) **COMRPOC** (Racet Computes).....an auto load program for disk users.....allows the user to insert a diskette into their **MOD-III** and have the computer take over all loading.....load a machine language program, BASIC, RUN a certain program all without pressing a single button .....allows your computer to perform 10, 20, 30 or more functions without pressing a single button **$30.00***

(24) **INFINE BASIC** (Racet Computes).....adds a variety of machine language subroutines to your BASIC programs (without any machine language knowledge).....fast sorts.....matrix operations .....compress and uncompress data.....and more **$60.00**

(25) **INFINITE BUSINESS** (Racet Computes).....an add on package to **INFINITE BASIC**.....adds a variety of routines important to the businessman (increase accuracy of calculations and more) **$30.00**

(26) **DMS** (Racet Computes).....lightning fast machine language sort.....sorts up to 4 disk drives of information **$90.00***

(27) **BLINK** (Racet Computes).....allows you to RUN new programs without losing the variables stored in your previous program.....line many programs together without losing important variables **$30.00***

(28) **KFS-80** (Racet Computes).....now you can use ISAM (Index Sequential Access Files) on your **MOD-III**.....using ISAM in your BASIC programs allows instant access of your items in your data files.....use with mail programs.....inventory programs.....etc. **$100.00***

(29) **MAIL LIST** (Racet Computes).....all routines are in machine language allowing for quick access **$75.00**

* **FOR DISK ONLY**

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS ✓9

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

✓See List of Advertisers on page 306

Part 1.

An Idiot's Guide To Assembly Language

Robert C. Montgomery
67 Turtle Back Rd. West
New Canaan, CT 06840

There are some excellent books in circulation on assembly language programming; magazines carry helpful articles for the novice as well as for the pro; Radio Shack offers its Editor/Assembler and T-Bug with elaborate documentation. Surely, with all that help available, even an idiot can become fluent in assembly language.

Well, not *this* idiot! I have managed to gain a little skill in this area, but I did it through trial and error. I can do some things in assembler which are useful to me, but more importantly, I've reached the point at which I can understand the books and go on to develop real proficiency.

If you're having trouble getting over the threshhold, stick with me through this two-part article. We're going to go from square one all the way to square two, step by step. Get a copy of Radio Shack's Editor/Assembler, sit down at your TRS-80, and read on.

Why Bother?

It isn't an idle question. Level II BASIC is an excellent language; you can program anything in it, and you can program faster than in assembler, with less mindbenders to deal with along the way. There is really only one reason for working in assembly language: The machine code which assembly language produces executes as much as a thousand times faster! It also requires less memory for program storage, and it puts you one up on your friends. But speed is the only real reason for going to all the trouble I'm about to describe to you.

How important is speed? It can be *very* important if we're tracking incoming hostiles, or even crunching millions of numbers for the Controller's Department. In personal computing applications, however, it's most commonly needed in games. The user can drop dead of boredom while the machine is conducting a lengthy tree-search, or putting elaborate graphics on the screen, if such things are done in BASIC.

Suppose that we want to program a football game. We'll need a playing field. We plan a scale of one horizontal tab space to two yards. We'll want two double-width horizontal lines, 50 yards apart, for the sidelines; two double-width vertical lines at each end for the end zones; and nine vertical stripes for the yard markers. We'll make the 50-yard line double-width, and the other yardlines single width, as shown in Fig. 1, and we'll place the upper left corner of the field at screen position 384, so the top of the screen can be used for a scoreboard and the game controls.

Remembering that the goal lines are in the end zones, and that the sidelines are out of bounds, we might write the BASIC program shown in Fig. 2 to produce this result. Try it. You'll be amazed to find that the TRS-80 can do all that in only 3.4 seconds. But now visualize this as a subroutine in the game you're planning. You'll want to erase the entire screen for post-touchdown fireworks and to display game statistics on demand.

The user playing games on his 80 doesn't want to sit around watching graphics get drawn; he wants to get on with the job of clobbering his opponent. Will assembly language improve this? You better believe it. Before we're done, we're going to draw a complete football field so fast that you can't see it happen.

Using EDTASM

Begin by getting familiar with the operation of the Radio Shack Editor/Assembler: Load the tape as the manual instructs, using the name EDTASM after the System command. When the asterisks stop blinking, respond /, and TRS-80 EDITOR/ASSEMBLER 1.2 will appear. You'll then see an asterisk. That is EDTASM's prompt, equivalent to the greater than sign in BASIC. Now look at the Commands sections of the manual. Here are the commanual. Here are the commands which will be important to use at this stage:

- A Assemble source currently in buffer: Try A, and see what happens. It says NO TEXT IN BUFFER. Well, that makes sense. We just turned it on. But what is "source", what is "text", and what is a "buffer"?

EDTASM is a program which permits you to write in a language called assembler, to edit and correct your work, and then to record it on tape. It also translates your assembly language program into machine language, and permits you to record that as well.

The assembly language program is also called the text or source code, and the machine language program is also called the object code. The process of translation from text to machine language is called assembly.

The buffer is a segment of TRS-80 memory which holds the text while you are entering and editing it. When you press A, the text is assembled into machine code which the TRS-80 can read through the SYSTEM command and which, with a little bit of luck, it will execute to draw our football field. Both the text and the machine code are stored in memory while EDTASM is in oper-

INCOME TAX SYSTEM
FOR TRS-80* MODEL I, II or III

In the tax season just completed, our system, running on the magnificent line of TRS-80 computers, prepared thousands of lightning-fast, error-free tax returns a day in accounting offices nationwide.

Why not in yours? The investment is minimal. Our system requires no special operator training. Runs on your TRSDOS, nothing else to buy.

Features no other tax system, for any computer, has—

1. Full interactive user control, in tax-form language only, line-by-line.
2. Screen display of full 1040 and all schedules, prior to printout.
3. All formats IRS and State approved.
4. Schedule amounts automatically entered on Form 1040.
5. Your Preparer's Information automatically printed at bottom of Page 2, Form 1040.
6. Built-in Validation Check tests entire system, hardware and software.
7. Special printer adjustment routines: Margin Offset, Text Position, etc.
8. Fills in pre-printed forms (we supply) or use overlays. Your choice.
9. AUTOMATICALLY COMPUTES: Tax — Earned Income Credit — Maximum/Minimum Tax — Least Tax Method —All Percentage of Income Limitations — All Fixed Limitations.

   DOES INCOME AVERAGING IN EIGHT SECONDS!
10. Full support through the tax season, no charge.
11. Inexpensive yearly updates in accordance with tax-law changes.
12. Modular construction—Lets you order the type and size system you need.

Prices start at $237.95 (1040 & Schedule A)

25-page Descriptive Manual - $7.50
(Refundable on order)

MINIMUM SYSTEM REQUIRED:
Model I, 48K, 1 Disk Drive

✓10

CONTRACT SERVICES ASSOCIATES

706 SOUTH EUCLID • ANAHEIM, CA 92802
TELEPHONE: (714) 635-4055

*TRS-80 is a trademark of Tandy Corp.

✓See List of Advertisers on page 306

1562 gene traymham disc
3 hel cond. 5-8 mr

SAVE MONEY
ON 5¼''

DISK DRIVES
CABLE EXTENDER CARD $10
40 Track siemens, double density, assembled and tested, with grey textured finish case and power supply.

''FLIPPY'' SPECIAL
ONLY $349.00 Cash or Check
Includes cable and DOS
4116 250NS 8/$25 ✓36

COMPUTER SALES & SERVICE
P.O. Box 26352
5819 Camp Bowie Blvd.
Fort Worth, Texas
817-731-7412

™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter:

There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

68 MICRO JOURNAL
3018 Hamill Road
HIXSON, TN 37343 ✓91

Foreign Orders-Add:
Air Mail $35.00/Year Surface $12.00/Sear
1-Year $18.50 2-Years $32.50
3 Years $48.50
Canada & Mexico Add $5.50 Per Year
to USA Subscription Rate

INCOME TAX PROGRAM

FOR RADIO SHACK TRS-80™ MOD.I, LEVEL II COMPUTERS

$19.95
8K CASSETTE

TRS-80 is a registered trademark of Tandy Corp.

Save time, guesswork. Program takes income, deductions, cap. gains, etc. and computes adj. gross income, s.e. tax, FICA and taxes due. Great for year-round tax spot check, too!

STOCK CHARTING. Let your computer draw your chart.	8K	15.95
TAX INFO. FILE & BUS. MILEAGE Add $4 for disk	8K	10.95
MAIL LIST, LABELER. Disk only	32K	24.95 inc. disk

Add $1.50 handling

BAP$ SOFTWARE ✓152
6221 Richmond, Suite 220
Houston, Texas 77057
783-3433

ation.

- B Return to BASIC in ROM: Don't do it unless you mean it. If you do, you'll have to reload EDTASM again, and both versions of the program you're working on will be erased. The NEW command in BASIC is very similar.
- I Insert a source line: You have to tell the computer where to insert it. I100, for example, tells it to insert it at line 100. I also has the features of AUTO in BASIC. I100 provides lines starting at 100 with the default increment of 10. I100,50 starts at 100, with increments of 50.
- E Edit a specified command: What they mean is, edit a specified line. E100 permits you to edit line 100. The subcommands—I, H, C, and others—are nearly identical to those you use in BASIC.
- R Replace line currently in buffer: R100 wipes out the text in line 100. The line number remains, and you can proceed to enter new text from the beginning of that line.
- W,L Write (W) or Load (L) a text file to or from tape: CSAVE or CLOAD, in other words. It's the text that is loaded and saved and not the machine code.
- H,P Print a specified range of source code to line printer (H) or screen (P): LLIST and LIST, in other words. But you can't simply use P or H, except to list the current line only. You must specify which line you want, using P100:500, for example. Why a colon instead of a comma, as required in I? Who knows?
- Horizontal tab: Works just as it does in BASIC, but it's important in assembler. As you'll see, elements of a line of text are separated by their tab positions.

Unless you're a lot smarter than I, you have some unanswered questions. For example:

1. How do you stop entering lines? You use break. In fact, you almost always use break when you want to stop what you're doing and start something else.
2. How do you exit from the edit mode? Press enter. You can also use E, as in BASIC, but why bother?
3. How do you start entering lines? You use I, even though there are no other lines to insert the new one between. Use I100, for example, if you want the first line to be line 100.
4. How do you run the program you've written? With EDTASM in use, you can't. EDTASM simply creates the machine code which the computer can later execute, and the text can not be run under any circumstances. In order to run your program, you must:
   a. Record the machine code on cassette.
   b. Exit EDTASM (using B, or the off-on switch).
   c. Load the machine language tape into the TRS-80, using the System command.
   d. Respond to the *- prompt with /, as you did to run EDTASM.
5. How do you record the machine code? There's no command for that purpose. When you use A to assemble the text into machine code, the screen will display READY CASSETTE. Get a cassette ready to record, then hit any key. If you don't want to record after assembly, press break.
6. System requires a program name. How do you give your program a name? Instead of using A, use A MYPROG, or whatever you want to call it. If you use A

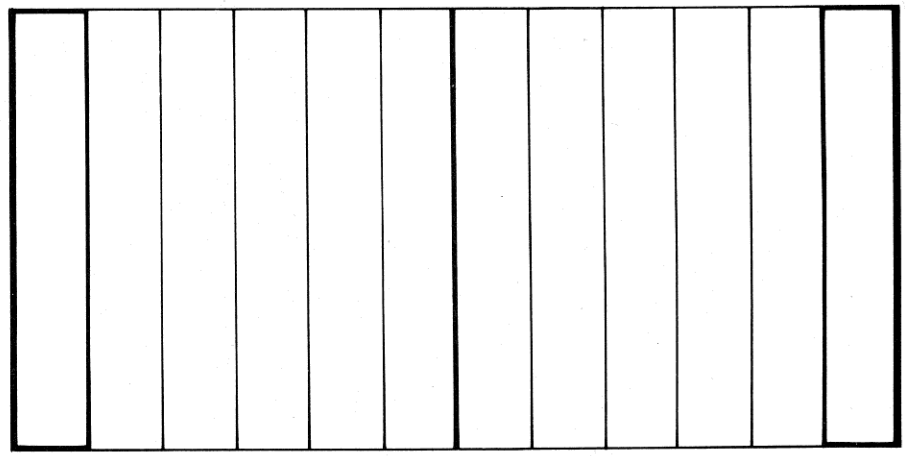


Fig. 1

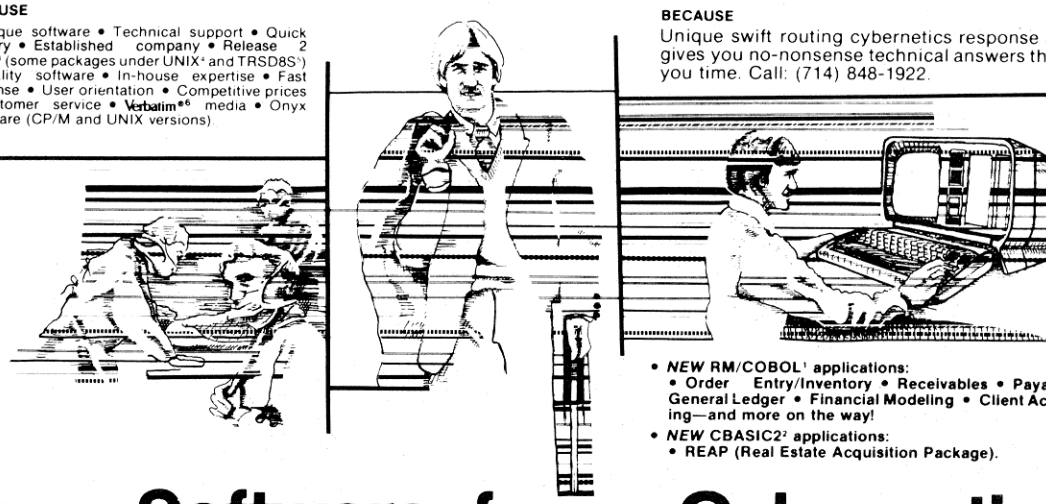
Why Do Professionals Prefer

BECAUSE

• Unique software • Technical support • Quick delivery • Established company • Release 2 CP/M[3] (some packages under UNIX[4] and TRSD8S[5]) • Quality software • In-house expertise • Fast response • User orientation • Competitive prices • Customer service • Verbatim®[6] media • Onyx hardware (CP/M and UNIX versions).

BECAUSE

Unique swift routing cybernetics response system gives you no-nonsense technical answers that save you time. Call: (714) 848-1922.



• *NEW* RM/COBOL[1] applications:
• Order Entry/Inventory • Receivables • Payables • General Ledger • Financial Modeling • Client Accounting—and more on the way!

• *NEW* CBASIC2[2] applications:
• REAP (Real Estate Acquisition Package).

Communication Arts, Huntington Beach, Ca.

Business
Medical
Real Estate
Computer Systems

Software from Cybernetics?

RM/COBOL—The new standard for microcomputer COBOL!! The only COBOL for CP/M (also on TRSDOS & UNIX) with alternate keys (multi-key ISAM), CRT screen handling, interactive debug, and the most useful Level 2 features. Compatible with RSCOBOL[5]—but runs faster.

TRS-80[5], Model II CP/M—The fastest Mod II CP/M with the most features. Outstanding teaching documentation for newcomers to CP/M, multiple CRT emulation, down loading package, support for CORVUS 10 Mb hard disk. Many additional user-oriented features.

Plus existing CBASIC2 packages:
APH[7] (Automated Patient History)
Osborne & Assoc.—Payroll • Payables/Receivables • General Ledger
NAD[8] (Name and Address)
PMS (Property Management System)

And system software packages:
MAGIC WAND[9] Editing/Word Processing
CBASIC2 Compiler BASIC
QSORT[8] Soft Merge Package

Distributed in U.K. by:
Microcomputer Applications Ltd.
11, Riverside Court, Caversham, Reading, England
TEL: (0734) 470425

Inquire for details

Trademarks of: [1]Ryan-McFarland Corp., [2]Compiler Systems, Inc., [3]Digital Research, [4]Bell Telephone Laboratories, Inc., [5]Tandy Corp., [6]Verbatim, Inc., [7]Cybernetics, Inc., [8]Structured Systems Group, Inc., [9]Small Business Applications, Inc.

CYBERNETICS INC
8041 Newman Ave., Suite 208
Huntington Beach, CA 92647
(714) 848-1922

Pan American Electronics

INCORPORATED

✓64

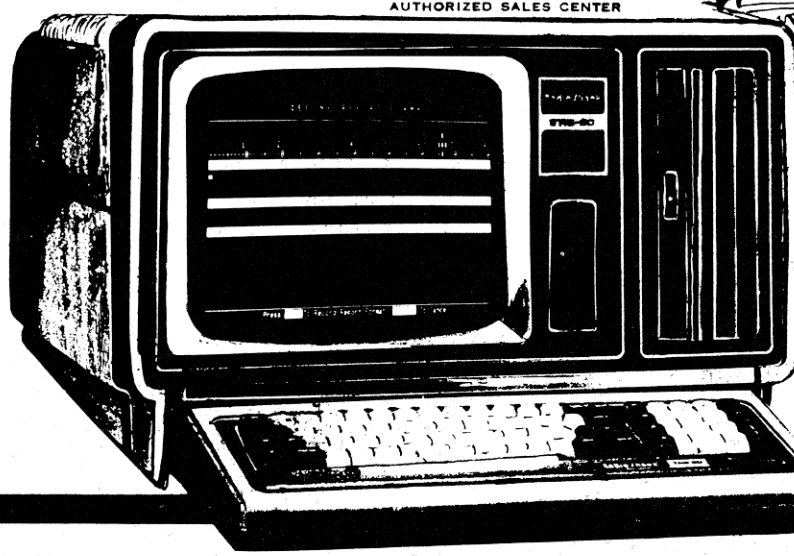
LOWEST PRICES ON THE

TRS-80

Computers

For Business, Learning and Entertainment

a **Radio Shack**
AUTHORIZED SALES CENTER



For More Information Call

TOLL FREE ORDER NUMBER
800-531-7466
Texas & Principal NUMBER
512-581-2765
Telex Number 767339
Dept. 80, 1117 Conway
Mission, Texas 78572

✓See List of Advertisers on page 306

```
1000 P=15360 : CLS
1010 FOR I=384 TO 444 : POKE P+I,131 : NEXT
1020 FOR I=896 TO 957 : POKE P+I,176 : NEXT
1030 FOR I=384 TO 896 STEP 64 : POKE P+I,191 : POKE P+I+5,191 :
POKE P+I+56,191 : POKE P+I+61,191 : NEXT
1040 FOR I=394 TO 414 STEP 5
1050 FOR J=0 TO 512 STEP 64
1060 IF J=0 POKE P+I,171 ELSE IF J=512 POKE P+I+J,186 ELSE POKE
P+I+J,170
1070 NEXT J,I
1080 FOR I=415 TO 435 STEP 5
1090 FOR J=0 TO 512 STEP 64
1100 IF J=0 POKE P+I,151 ELSE IF J=512 POKE P+I+J,181 ELSE POKE
P+I+J,149
1110 NEXT J,I
```

Notes: Time requirement 3.4 seconds
Memory requirement 378 bytes
Speed can be improved slightly and memory significantly by compression and other optimization.

Fig. 2. Drawing a Football Field in BASIC

alone, the program will have the default name NONAME. Why a space, instead of a comma or a colon? Who knows?

7. Suppose the machine code needs correction. What do you do then? You must:
   a. Reload EDTASM.
   b. Reload the text (using L).
   c. Edit.
   d. Re-assemble and re-record text and machine code, because this is not the last time you'll have to edit.
   e. Exit EDTASM.
   f. Load the machine code, using SYSTEM.
   g. Run it, using /, discover more errors, and reload EDTASM to begin again.
8. Isn't that a lot of work? Yes, it is. It is a very awkward system. In fairness to Radio Shack, the companion T-Bug program permits you to run, edit and re-run without all of these saves and loads, although you'll have to edit the machine code directly without the help of assembly language.

Hex = 5A9E

5	=	5 ×	4096	=	20480
A	=	10 ×	256	=	2560
9	=	9 ×	16	=	144
E	=	14 ×	1	=	14
					23198

Decimal = 23198

Fig. 3. Hex to Decimal Conversion

Decimal = 23198

23198 / 4096	= 5	(carry 2718)	5 = 5
2718 / 256	= 10	(carry 158)	10 = A
158 / 16	= 9	(carry 14)	9 = 9
14 / 1	= 14		14 = E

Hex = 5A9E

Fig. 4. Decimal to Hex Conversion

Hexadecimal Numbers

Hex is a base 16 numbering system, whereas decimal is base 10, and binary is base 2. Hex and decimal numbers are the same from zero to nine. Decimal 10 is hex A, decimal 11 is hex B, and so on through decimal 15 (hex F).

We will deal only with positive integers, in the range of 0 through 32767, which is 0 through 7FFF in hex. We need to know how to convert numbers in this range from hex to decimal and back again. One way is to buy a specialized calculator, which makes these conversions automatically. Doing it by hand is merely time-consuming and annoying—not really difficult.

To convert from hex to decimal, simply multiply the right-hand digit by 1, the next digit by 16, the next by 256, and the left-hand digit by 4096. Add the results, as shown in Fig. 3. From decimal to hex, reverse the process, as shown in Fig. 4.

When you're using EDTASM, hex numbers must have the suffix H (as in 5A9EH), and hex numbers beginning with a letter (like FFF9H) must be prefixed by a zero digit (0FFF9H). I will use both these conventions.

Assembly Language Statements

Assembly language requires line numbers, and each line must contain statements of specific types, subject to exact rules of syntax. Assembler uses short (two, three or four letter) mnemonics, so called because they are supposed to suggest their own meaning. ADD succeeds admirably in this, and LDIR does not.

Take a look at the center section of the EDTASM manual. You'll see a frightening array of these mnemonics. You will have to learn only a few of them for the project in hand. You'll also see references to registers, like A, C and HL. These are temporary storage places. We can put a value in a register, add to it, subtract from it, and retrieve it for future use. In BASIC, for example, we might write: X = 10. We could then use the value of X later in such ways as: Y = X + 1, or X = X + 5.

In BASIC, a symbol table is set up by the computer, containing the names of all the variables and the locations in memory where their values are stored. When we reference a variable named X (as in Y = X + 1), for example, the computer goes to the table, finds that the value of X is stored in location 18234, and uses that value to compute the value of Y. It then sets up an entry in the table to show where Y is located, and stores the value of Y in that place.

In assembly language, we don't have the luxury of naming variables (nor do we have to pay for that luxury in slow execution). Instead, we have to tell the computer where to store each value. If we want to use it again, we will have to tell the computer where to find it.

Values can be stored in two places: In a register, such as the A register; or in a specific place in memory, such as location 18234, or 473AH. A register can also point to a place in memory at which the value is stored. 18234, for example, could be stored in a register, and the computer then told to use the value whose location is contained in that register.

To store the value of 10 (decimal) in register A, we might use the following text: "LD A,0AH", which means "Load the value AH into register A". Note the 0 prefix, (necessitated because AH starts with a letter), and the tab between LD and A,0AH. Finally, note that the name of the register comes from first and the value follows, separated by commas.

Alternatively, we could write: "LD A,(473AH)", which means "Load the value to be found in location 473AH into register A". The location is in parentheses, which tell the computer that this is the location at which the value will be found, rather than that this is the value itself.

```
I110
00110    LD   A,58H          ;"X" = 88 = 58H
00120    LD   (3CF0H),A      ;SCREEN LOCA
TION 15600 = 3CF0H
00130
*— (after pressing break)
```

Fig. 5. Screen After Program Entry

```
*A
0000 3EF8     00110    LD   A,58H      ;"X" = 88 = 58H
0002 32F03C   00120    LD   (3CF0H),A ;SCREEN LOCA
TION 15600 = 3CF0H
NO END STATEMENT
00001 TOTAL ERRORS

READY CASSETTE
*— (after pressing break)
```

Fig. 6. Screen After Assembly

Can we write: "LD (473AH),0AH", meaning "Load AH into location 473AH"?

We cannot—don't ask me why. We have to do it in two steps:

```
LD    A,0AH
LD    (473AH),A
```

It is characteristic of assembly language programming to make things harder for the programmer, and easier for the computer.

One final complexity. Could we write: "LD A,473AH", meaning "Load 473AH into register A"?

Again, we cannot. Single registers, such as A and C, can handle only one byte at a time—integers between 0 and 255. 473AH requires two bytes. Assembler gives us a break here, however. We need two registers to handle two bytes, and we can accomplish this automatically by referring to a pair of registers.

Thus, in order to put AH into location 18234, we could write:

```
LD    HL,473AH
LD    (HL),0AH
```

which means "Load 18234 into register pair HL, then load AH into the location found in register pair HL."

These simple statements are all we need to draw that football field.

PRINT X

In BASIC or assembler, to print the letter X on the screen, the character value 88 (ASC("X") = 88) is loaded into one of the TRS-80's screen memory locations (15360 through 16383). Where it prints depends upon which of these locations we select. (Let's use location 15600, which is toward the top right of the screen. That's 3CFOH, and 88 is 58H.)

Your screen has been idle for some time, and it still reads NO TEXT IN BUFFER, *__. Respond to that prompt with I110, and you see 00110 appear. EDTASM is ready for line 110 of our text. Type in the code shown in Fig. 5, using the tab arrow to line up the columns. Note the comments in the last column preceded by semicolons, which are the equivalent of REM or apostrophe in BASIC.

Check your entries against Fig. 5. Edit if necessary. Now press A and, when you see READY CASSETTE, press Break. The screen should look like Fig. 6.

What is 00001 TOTAL ERRORS? You'll be glad to know that there are 00003 total errors, and not just 00001, but EDTASM has identified only 00001. (I like the way the designer provided for 99999; it gives us a feeling for his confidence in our skill). Here are the three:

1. The left-hand column lists the locations in which the machine code is to be stored in memory, beginning with 0000. Unfortunately, that can't be done, it's the very beginning of BASIC ROM, and we can't write into that area. Pick a place in RAM which is not otherwise inhabited; it's best to pick a place which will not interfere with any BASIC program we may want to use in conjunction with the machine language program.

MEMORY SIZE? 32610, for example, sets aside memory locations 32611 through the end of RAM (32767 in a 16K machine) for machine language programs stored through the SYSTEM command.

To specify where the program is to reside, assembler provides the statement ORG. Type I100 to insert an additional line 100 at the beginning of the program, and then enter the following:

```
00100    OR6   7F63H   :STORE AT 32611 = 7F63H
```

2. Level II BASIC does not require an END statement, but assembler does. Insert a new line 140:

```
00140    END
```

3. The program as it is now written will work correctly, but we'll never know it. The X will print at location 15600, but the program will be completed and the TRS-80 returned to its power up condition so fast that we'll never see the X. An endless loop will stop the program before the END statement, like "130 GOTO 130" in BASIC. Insert a new line 130:

```
00130 LOOP   JP   LOOP    ;ENDLESS LOOP
```

That's the first time we've used the tab field immediately following the line number. It's used for labels—named places in memory whose actual location EDTASM will compute and remember. JP means Jump, and the place to which the program jumps is found in the fourth column: In this case, the place in memory named LOOP.

During execution, the computer finds the label called LOOP, and makes note of its location. When it encounters JP, it looks to see where it should JP to, finds that it should JP to a location named LOOP, does so, and repeats the process endlessly.

Press A again. Your screen should look like Fig. 7. Instead of pressing Break, this time load a fresh cassette into your recorder, set it to record, and hit any key to save the machine language version of the program on cassette. Advance the tape a few clicks and remember the place. Press record again, and enter W on the keyboard. The text version of the program will be saved on the cassette beginning at the second location. You don't have to save the text, but you'll have to reenter it by hand if you don't. There's no way to reload the machine language version into EDTASM.

Exit EDTASM (using B). Rewind the cassette to the beginning. Press play. Respond to MEMORY SIZE? with 32610, and then enter SYSTEM. You'll see the prompt ?—, which means that the computer wants the name of the machine language program it is to load. Since we gave it no name, enter the default name NONAME.

After it loads, you'll see another ?— prompt. Respond /32611, which means "Ex-

```
A*
7F63                00100                ORG   7F63H       ;STORE AT 32
611 = 7F63H
7F63 3E58           00110                LD    A,58H       ;"X" = 88 = 58H
7F65 32F03C         00120                LD    (3CF0H),A   ;SCREEN LOCA
TION 15600 = 3CF0H
7F68 C3687F         00130 LOOP           JP    LOOP        ;ENDLESS LOO
P
0000                00140                END
00000TOTAL ERRORS

LOOP 7F68
READY CASSETTE
```

Fig. 7. Screen After Revised Assembly

ecute the program beginning at memory location 32611", which is the 7F63H we specified as the ORG in line 100, and, by golly, we have an X on the screen. It appears in addition to the other contents of the screen because our program did not contain a screen clearing instruction.

After you've admired that X for a sufficient length of time, you'll find something else our program did not contain: a way to stop. It continues to churn back and forth from the beginning of line 130 to the end of line 130, and back again. To exit, you'll have to press the reset button.

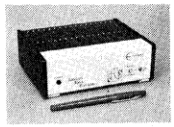
What does the machine code look like? One way to find out is to PEEK into the memory locations in which it is stored. Press that reset button, if you have not already done so. Enter: FOR I=32611 TO 32622 : PRINT PEEK (I); : NEXT. You get: 62 88 50 240 60 195 104 127 255 255 255 255. Translate those decimal numbers into hex, omitting the 255's (they are simply nulls remaining after the end of the machine code). You get: 3E 58 32 F0 3C C3 68 7F.

Look back at the text of the assembly language program in Fig. 7. These hex numbers are identical with those appearing in the second column. This is the machine code representation of the mnemonics, register names, values and locations we specified in the text. When you loaded NONAME into the machine, it placed these codes in locations beginning at 32611. PEEK pulled them out and translated them into decimal.

That's all there is to the machine code—no line numbers, no comments, no mnemonics, just these codes. There are only eight of them, and that means that the memory required to store this exciting program is only eight bytes.

Of course, the program didn't do much, either. But our illustrative BASIC program took 46 bytes to do the same inconsequential job, and would take 27 bytes even if optimized. We can't see much difference in speed yet—how long could it take to print an X? But we will, in Part II of this article. ■

HATCH A PLOT
WITH YOUR TRS-80*
Use ESP the Educated Slave Processor



+ Full plotting control features
+ Self-contained microprocessor
+ Connects TRS-80* master computer to user-supplied X-Y Recorder
+ Converts commands to voltage outputs
+ Plots vectors, dots, X and Y axes, and ASCII characters
+ Buffers commands to optimum speed of recorder
+ Price is $450.
+ Manual sold separately for $10.
+ Manual price refundable with purchase of unit

Or Use MICRO-PEN Software
+ ESP capabilities except buffering
+ Runs in TRS-80* computer
+ Requires user-supplied D/A and pen control interfaces
+ Price is $99 on diskette
+ Schematic and parts information provided for electrical interface

For additional information, write to:
Epsilon Systems
969 Crown Ave.
Santa Barbara, CA 93111 ✓487

*TRS-80 IS A TRADEMARK OF TANDY CORPORATION

NEW FROM MANHATTAN

FOR MODELS I AND III — MANY NOW ON DISK

CASINO BLACKJACK/COUNTER Learn to beat the dealer, or just play for fun, with this most realistic simulation of a casino table ever put on the TRS-80 screen. Does card counting really give the sharp player an advantage? How should you play each type of hand? The program gives you the card count after each hand, plus a recommended bet, and deals tirelessly. I/III — TBJ/C $14.95; TBJ/D $19.95

GIN RUMMY 3.0 The classic computer Gin Rummy game is now even better, with card graphics and faster playing time. Plays a full regulation game, changes strategy to counter your play, allows rearrangement of your hand on each turn, keeps score to game level. I/III — TGR/C $16.95; TGR/D $21.95

CRIBBAGE MASTER Great graphics and strong play. I/III — TCM/C $12.95; TCM/D $17.95

CALCULATOR PLUS makes your TRS-80 a printing calculator. I/III — TPC/C $ 9.95

CHECKBOOK PLUS handles the details of bank statements. I/III — TCB/C $ 9.95

CALCULATOR & CHECKBOOK both on one cassette or disk. I/III — TCC/C $14.95; TCC/D $19.95

E.S.P. LAB Do **you** have ESP? Scientific/fun program. Mod I — TPL/C $ 9.95

THE LISTMAKER II 400 names & codes in 16K, prints lists. Mod I — TLM/C $ 9.95

CONCENTRATION Classic matching game, graphics & sound. Mod I — TCO/C $ 9.95; TCO/D $14.95

LABYRINTH RUN Fascinating/frustrating test of skill. I/III — TLR/C $ 9.95

California residents add 6% sales tax.

24-hour credit card order hotline: (213) 454-8290
Write for full catalog of TRS-80 and Atari software.

VISA — MasterCard

MANHATTAN SOFTWARE ✓90
P.O. Box 35, Pacific Palisades, CA 90272

DISCOUNT PRINTER RIBBONS 40% OFF!! OR MORE!

BRAND NEW, TOP QUALITY, EXACT REPLACEMENT RIBBONS FOR ALL OF THE DOT MATRIX TRS-80,* & CENTRONICS PRINTERS:

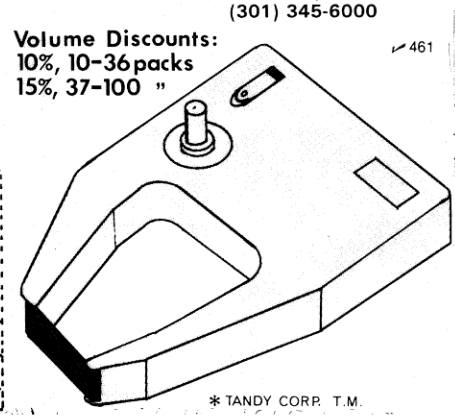
Send order blank below & PAYMENT (Min. $20) TO:

ANCIE LABORATORIES
9202-9206 BALTIMORE BOULEVARD
COLLEGE PARK, MD 20740
(301) 345-6000

Your PRINTER	RETAIL LIST	Your Wholesale Price	ITEM NUMBER
TRS-80 LINE PRINTER II	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
TRS-80 LINE PRINTER III	21.95 + Tax (IN CART)	9.95 PER (RIBBONS ONLY)	T-3
TRS-80 TRACTOR FEED	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS MODS 700-704	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS #730	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS #737	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS #779	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700

Volume Discounts:
10%, 10-36 packs
15%, 37-100 "

✓461



MINIMUM ORDER: $20.00 No shipping charges or taxes.
PLEASE SEND ME: _____ C-700, 3 RIBBON PACKS & _____ T-3 RIBBONS.
I WILL USE THESE RIBBONS ON A _____ PRINTER.
$_____ ENCLOSED ··· ··· ··· SEND C.O.D. ( )
Name _____
Address _____
City, State, Zip _____

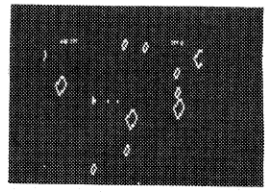
ANCIE LABORATORIES 9202-9206 Baltimore Blvd., College Park, MD 20740 301-345-6000

* TANDY CORP. T.M.

Games from BIG FIVE will turn your computer into a

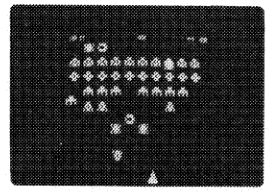
TRS-80 HOME ARCADE

SUPER NOVA©



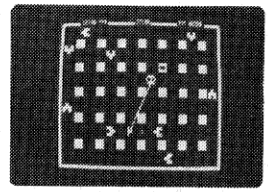
If you and your TRS-80 have longed for a fast-paced arcade-type game that is truly a challenge, then **SUPER NOVA** is what you've been waiting for. In this two player machine-language game, large asteroids float ominously around the screen. Suddenly your ship appears and you must destroy the asteroids before they destroy you! (But watch out because big asteroids break apart into little ones.) The controls that your ship will respond to are thrust, rotate, hyperspace, and fire. All right! You've done it! You've cleared away all the asteroids! But what is that saucer with the laser doing? Quick! You must destroy him fast because that guy's accurate!

GALAXY INVASION©



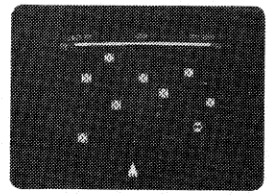
The sound of the klaxon is calling you! Cruel and crafty invaders have been spotted in battle formation warping toward Earth at an incredible speed. Suddenly, your ship materializes just below the huge flock of invaders. Quickly and skillfully you shift right and left as you carefully fire your lasers at them. But watch out! A few are breaking out of the convoy and flying straight at you! As the whine of their engines gets louder, you place your finger on the fire button knowing all too well that this shot must connect—or your mission will be permanently over! With sound effects!

ATTACK FORCE©



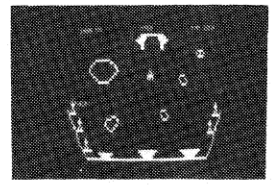
Your TRS-80 screen has been transformed into a maze-like playfield for this game. As your ship appears on the bottom of the screen, eight alien ramships appear on the top. All of them are traveling at flank speed directly at you! Quickly and boldly you move toward them and fire missiles to destroy them. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the wrath of the keeper of the mazefield: the menacing "Flagship". You must destroy him fast because, as you will find out, that guy's accurate! With sound effects!

COSMIC FIGHTER©

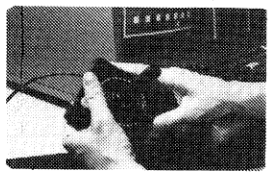


With thousands of stars whizzing by you, your **SPACE DESTROYER** ship comes out of hyperspace directly under a convoy of aliens. Almost effortlessly, you skillfully destroy every last one. But before you can congratulate yourself, another set appears. These seem to be slightly more intelligent than the first set. Quickly you eliminate all of them, too. But your fuel supply is rapidly diminishing. You must still destroy two more sets before you can dock with your space station. All right! The space station is now on your scanners! Oh no! Intruders have overtaken the station! You must skillfully fire your neutron lasers to eliminate the intruders from the station before your engines run out of fuel and explode! With sound!

METEOR MISSION II©



As you look down on your space viewer you can see the stranded astronauts that are crying out for you to rescue them. But first you must maneuver your shuttle down through the asteroids & meteors before you can reach them. Great! You've got one! But now can you get back to the space station to save your fellow shipmate or will you crash and kill both of you? You can fire your lasers to destroy the asteroids, but watch out, because there could be an alien FLAGSHIP lurking behind! Includes sound effects!



NEW JOYSTICKS!

For $39.95 it's now possible to have the famous ATARI joystick interfaced with your Model 1. All of our tapes are now completely compatible with the joystick. Packaged with complete instructions, you can even use it with your own programs! If your old tapes do not say "Joystick Version" on them and you wish to exchange them for new Joystick versions, enclose $2 and your old tape. (Call or write for info on Mod 3 joysticks.)

BIG FIVE SOFTWARE

✓357

P.O. Box 9078-185, Van Nuys, California 91409

For MC/Visa or COD orders, call (213) 782-6861 from 9am-5pm Pacific time.

Prices per game: Level 2, 16K Mod 1/Mod 3—$15.95
Level 2, 16K Mod 1/Disk—$17.95

10% discount for 2 items, 15% for 3 or more. (Including Joystick)
Please add $1.50 postage/handling, Calif. residents add 6% tax.
All games are written in machine language and supplied on cassette.
Disk versions save high scores to your TRSDOS or NEWDOS diskette.

Cassette versions require 16K memory, disk versions require 32K.
We accept checks, money orders, and MC/Visa orders.
All games ©1980 by Bill Hogue & Jeff Konyu.
TRS-80 & TRSDOS are trademarks of Tandy Corp.
NEWDOS is a trademark of Apparat, Inc.
Dealer inquiries invited.

When white is black on the Model I.

Inverse Video

Brian D. Smith
6770 Halifax St.
Burnaby, B.C., Canada V5B 2R4

Have you ever drooled over some of the other personal computers with their inverse video cursors and their ability to display some sections of the screen in black on white and others in white on black? Although Tandy decided that we did not need or want this feature, it is possible to add it to a TRS-80.

With three ICs, one switch, and a lowercase modification, you can reverse any location or locations on the screen with a simple POKE. There *is* a "gotcha," however: You cannot have inverse characters and graphics on the screen simultaneously.

I recently found an inverse character modification in a users' group newsletter. It used the eighth bit of each character (normally used to indicate a graphics character) to identify an inverted character. I installed the mod and was quickly disappointed. The inverse field always appeared 1½ characters to the left of the location inverted. The author had a clever program that got around this problem, but I thought, there must be a better way.

A Modification Is Born

I began by studying the circuit diagrams and descriptions in the *TRS-80 Microcomputer Technical Reference Handbook.* Anyone planning to modify an 80 should have one; my explanation of the operation of the modification will assume you have a copy of the schematic from the handbook.

I decided that the best method of decoding inverse characters is with bit 7, the graphics bit. This means graphics and inverse characters will not be available at the same time. However, all alphanumeric characters can be reversed. Since the primary use of inverse characters will be with text, this seems to be the best compromise.

Bit 7 must be synchronized with the other data bits. Looking at the 80's schematic, you will see on the second sheet that bits 0 through 5 go from the video memory chips to Z28, and bits 6 and 7, along with some other signals, go to Z27. These two ICs are simply latches used to hold the data read from the video memory.

Bits 0 through 6 are then sent to both Z29 (the character generator) and Z8 (the graphics generator). Up to this point, bit 7 is still in step with the other data bits. From Z29 and Z8, the data bits go to Z10 and Z11, which are shift registers used to output the characters from the generators one dot at a time.

Bit 7 is used to select which shift register accepts data, determining whether a normal or graphics character is displayed. The problem is that bit 7 is only around long enough to load the shift register. By the time the dots are being output from the register, the values at the latches of all the data bits, including bit 7, are those for the next character to be displayed. The result is that the inverse video always appears one character-width to the left of where you intended.

Parts List

S1	DPDT switch
Z10A	74LS166
Z26A	74LS20
742A	74LS86

Misc. thin-guage wire (wire wrap is ideal)

```
10 ' INVERSE AND LOWERCASE VIDEO DRIVER SETUP PROGRAM
20 CLEAR 100
30 CLS
40 ' GET THE CURRENT MEMORY SIZE
50 MS = PEEK(16561) + PEEK(16562) * 256
60 MS = MS - 49
70 ' SET THE BASIC MEMORY SIZE
80 POKE 16561, MS - (256 * INT(MS/256))
90 POKE 16562, INT(MS/256)
100 M = MS
110 IF M > 32767 THEN M = M - 65536
120 ' LOAD THE DRIVER INTO HIGH MEMORY
130 FOR I = M+1 TO M+49
140   READ N
150   POKE I,N
160   NEXT I
170 ' SET UP THE ADDRESS OF THE INVERSION MASK
180 MH = INT((MS+49)/256)
190 ML = (MS+49) - (256*MH)
200 POKE M+16,ML : POKE M+17,MH
210 POKE M+21,ML : POKE M+22,MH
220 POKE M+43,ML : POKE M+44,MH
230 ' LOAD THE ADDRESS OF THE DRIVER INTO THE VIDEO DEV
    ICE
240 ' CONTROL BLOCK
250 POKE 16414, (MS+1) - (256 * INT ((MS+1)/256))
260 POKE 16415, INT((MS+1)/256)
270 CLEAR
280 END
290 DATA 221, 110, 3, 221, 102, 4, 218, 154, 4, 121
300 DATA 254, 127, 32, 9, 58, 0, 0, 238, 128, 50
310 DATA 0, 0, 201, 221, 126, 5, 183, 40, 1, 119
320 DATA 121, 254, 32, 218, 6, 5, 254, 128, 210, 166
330 DATA 4, 58, 0, 0, 177, 195, 125, 4, 0
```

Program Listing 2. Cassette based inverse video driver.

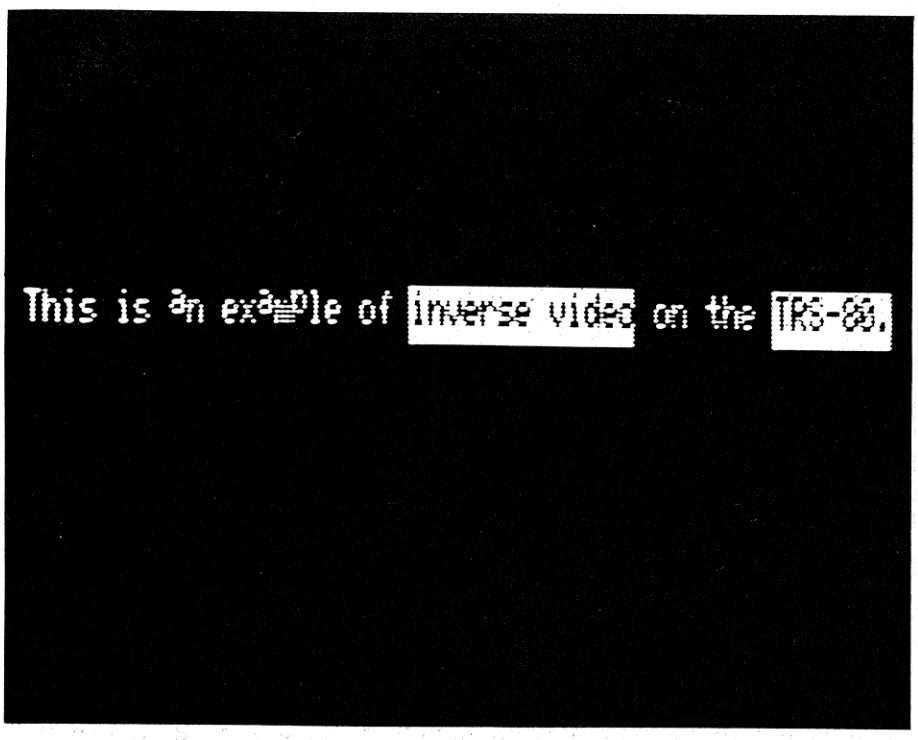


Photo 1

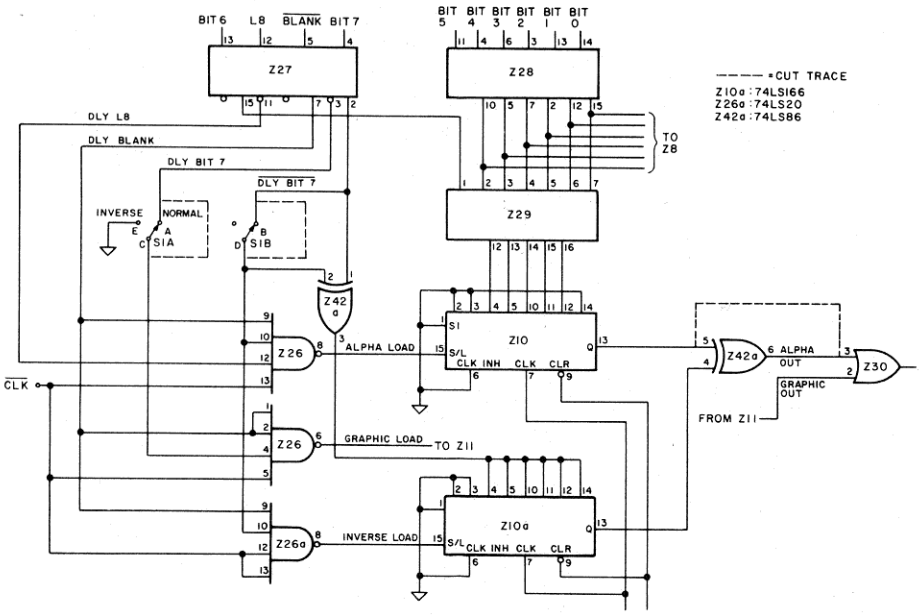


Figure 1. Inverse Video Schematic.

The solution is to install a new shift register for bit 7, the inverse character signal. This new shift register, which I call Z10A, is run in parallel with Z10, so the inverse signal keeps pace with the character output.

A complete description of how this modification works follows (see Fig. 1).

The DPDT switch is used to choose between the normal graphics mode and the inverse character mode. In the normal position, the bit 7 signals are passed through to Z26 as usual. In the inverse mode, DLY BIT 7 is forced low and $\overline{\text{DLY BIT 7}}$ is forced high, as when displaying alphanumeric characters. When bit 7 is high, in inverse mode, pin 2 of Z27 goes low. The difference between this signal and DLY BIT 7 (after the switch) is detected by Z42A, and pin 3 goes high. This signal is fed into Z10A. The high bits are then output in step with the bits from Z10. The two signals are then exclusive-ORed by Z42A. Since the output from Z10A is high, the character bits are inverted.

When the switch is in normal position (bit 7 is low), pin 3 of Z42A will be low, since both inputs are the same. This signal will be input to Z10A and stepped out as before. Since the output from Z10A is now low, when the exclusive-OR is done the character bits will be unchanged.

Z26 causes Z10 to load alphanumeric data when the CLK, DLY BIT 7, DLY BLANK, and DLY L8 signals are all low. Z26A does the same for Z10A, but does not use the DLY L8 signal, because DLY L8 is used to generate the four blank rows beneath each character. It is ignored by Z26A so that those four rows will also be inverted.

Lowercase is required to get inverse characters because when bit 7 is high in an unmodified 80, bit 6 is forced low. Therefore, all alphabetic inverse characters display as inverse control characters.

Installation

The first step when installing the inverse character modification is to find a handy place to mount the normal/inverse switch. I found the most convenient location to be on the upper half of the case, on the downward-sloping section just back of the keyboard. There is more than enough space between the case and the circuit board on which the keys are mounted for a miniature toggle switch.

The second step is to open up the S-80.

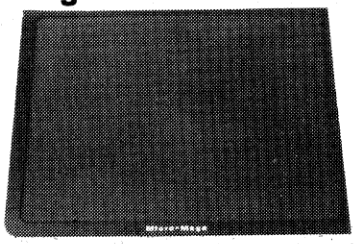
Once the case is open, place the circuit board on a flat surface, component side up. Locate ICs Z10, Z26, Z27, Z30, and Z42. Make the modification following these steps:

1. Bend all pins of Z10A, except 1, 2, 3, 6, 7, 8, 9, and 16 into a horizontal plane.
2. Bend all pins of Z26A, except 7, 9, 10, 13, and 14 into a horizontal plane.
3. Bend all pins of Z42A, except 7 and 14, into a horizontal plane.
4. Solder Z10A into position on top of Z10, soldering the unbent pins of Z10A to the corresponding pins of Z10.
5. Similarly solder Z26A on top of Z26.
6. Similarly solder Z42A on top of Z42.
7. Cut the trace between Z27 pin 3 and Z26 pin 4.
8. Cut the trace between Z27 pin 2 and Z26 pin 10.
9. Cut the trace between Z10 pin 13 and Z30 pin 3.
10. Solder a wire from Z10A pin 4 to Z10A pin 5.
11. Solder a wire from Z10A pin 5 to Z10A pin 10.
12. Solder a wire from Z10A pin 10 to Z10A pin 11.
13. Solder a wire from Z10A pin 11 to Z10A pin 12.
14. Solder a wire from Z10A pin 12 to Z10A pin 14.
15. Solder a wire from Z10A pin 5 to Z42A pin 3.
16. Solder a wire from Z10A pin 13 to Z42A pin 4.
17. Solder a wire from Z10A pin 15 to Z26A pin 8.
18. Solder a wire from Z42A pin 1 to Z27 pin 2.
19. Solder a wire from Z42A pin 2 to Z26 pin 10.
20. Solder a wire from Z42A pin 5 to Z10 pin 23. (You may find it easier to attach

for the TRS-80 from Micro-Mega

The Original GREEN-SCREEN

✓29



The eye-pleasing Green-Screen fits over the front of your TRS-80 Video Display and gives you improved contrast with reduced glare. You get bright luminous green characters and graphics like those featured by more expensive CRT units.

Don't confuse the Original Green-Screen with a piece of thin film stuck to the face of your video tube, such as that advertised by others. The Original Green-Screen is mounted in a full frame perfectly matched to the color and texture of the TRS-80 Video Display. It is attached with adhesive strips which do not mar your unit in any way.

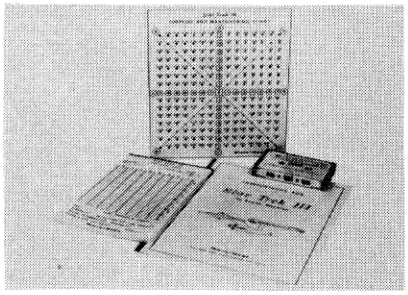
The full frame design of the Original Green-Screen "squares off" the face of your video display and greatly improves the overall appearance of your system.

(Specify whether for Model I or Model III)

THE GREEN-SCREEN.....*$13.95*

Add $1.00 for postage and handling.

THE ULTIMATE STAR TREK PACKAGE



Tired of trivial computer games? This complete Star Trek package will provide you with endless fascination and challenge. In addition to the program cassette, it includes comprehensive instructions, a pad of "Voyage Log" record sheets, and a free-standing "Torpedo and Maneuvering Chart."

The package is built around the latest version of Lance Micklus' incomparable Star Trek III, a 13,000 byte program with a host of subtle and imaginative features, which include numerous dynamic and spectacular graphic displays. Star Trek III puts you in command of the Enterprise cruising in a galaxy of 192 quadrants filled with uncharted hazards, including hostile Klingons, pulsars, and black holes. You have at your disposal scanners, various weapons and defense systems, on-board computers, and a loyal crew. (You will need them all to survive the Klingons.)

Your mission is to rid the region of Klingons and to locate five inhabitable planets, all within 300 stardays, before returning to Star Fleet Headquarters where your overall effectiveness as a starship commander will be scored. High scores are possible only with careful planning and effective battle tactics. The "Voyage Log" sheets will guide your strategy, and the "Torpedo and Maneuvering Chart" will give you a vital edge in combat. (When you engage three Klingon ships you can't afford to miss.)

STAR TREK PACKAGE (for Level II, 16K only).....*$22.95*

Add $1.00 for postage and handling

Terms: Check or money order, no CODs or credit cards, please. Add amount shown for postage and handling to price of the item. All items shipped within 48 hours by first class or priority mail. Virginia residents, add 4% sales tax.

Micro-Mega · P.O. Box 6265 · Arlington, Va 22206

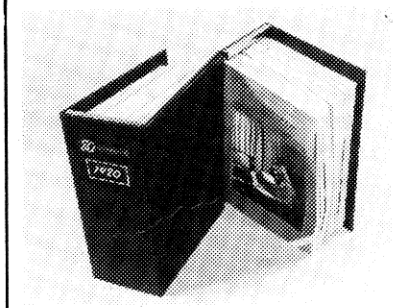
is HARD COPY STORAGE a problem?

Here's the ideal way to keep your growing collection of *80 Microcomputing* in order! The *80 Microcomputing* Library Shelf Boxes. . . . sturdy, corrugated, white, dirt-resistant boxes will keep your issues of *80 Microcomputing* orderly and available for constant reference. Self-sticking labels are available for the boxes, too, not only for *80* but also for *Kilobaud/Microcomputing, 73 Magazine, CQ, QST, Ham Radio, Personal Computing, Interface Age, Byte* and *Radio Electronics*. Ask for whichever labels you want with your box order. Each box holds a full year of the above magazines. Your magazine library is your prime reference: Keep it handy and keep it neat with these strong library shelf boxes. One box (BX1000) is $2.00, 2–7 boxes (BX1001) are $1.50 each, and 8 or more boxes (BX1002) are $1.25 each. Be sure to specify which labels we should send. Shipping and handling charges are $1.00 per order. Call in your credit card orders on our toll free line 800-258-5473, or use the order card in the back of the magazine and mail to:

80 microcomputing T.M. Peterborough, NH 03458

Please allow 4–6 weeks for delivery. No COD orders accepted.

80 microcomputing T.M. BINDERS order yours today



Keep your library of 80 Microcomputing safe from loss or damage in these handsomely appointed binders with rich dark green covers and gold lettering. Each binder holds 12 issues making an EXCELLENT REFERENCE HANDBOOK. Several binders form a quality library you can be proud of.

$7.50 each . . . 3 for $21.75 . . . 6 for $42.00 . . .

Postage paid in USA. Foreign orders please include $2.50 for postage.

Specify 1980 or 1981

Send check or money order only to:
80 MICROCOMPUTING BINDERS
P.O. Box 5120, Phila., PA 19141

Allow 6-8 weeks for delivery. Please no C.O.D. orders, no phone orders.

```
                00010 ;*********************************************************
                00020 ;* LOWER CASE AND INVERSE CHARACTER DRIVER PROGRAM       *
                00030 ;* (DISK VERSION)                                        *
                00040 ;*********************************************************
                00050 ;
007F            00060 RVCODE  EQU     7FH             ; REVERSE CONTROL CODE
401E            00070 VIDEO   EQU     401EH           ; VIDEO DCB ADDRESS
4049            00080 HIMEM   EQU     4049H           ; DOS HIGH MEMORY POINTER
                00090 ;
FFB0            00100         ORG     0FFB0H
                00110 ;
FFB0 21BFFF     00120 LOADER  LD      HL,START        ; GET DRIVER ADDRESS
FFB3 221E40     00130         LD      (VIDEO),HL      ; AND INSERT IT INTO THE
                00140                                 ;   VIDEO DEVICE CONTROL
                00150                                 ;   BLOCK
                00160 ;
                00170 ; THE FOLLOWING TWO INSTRUCTIONS AUTOMATICALLY SET THE
                00180 ; DOS HIGH MEMORY POINTER.  THIS ONLY APPLIES TO NEWDOS
                00190 ; (2.1 OR 80) AND TRSDOS 2.2 OR LATER.
                00200 ; FOR OTHERS, THEY SHOULD BE DELETED.
FFB6 21BEFF     00210         LD      HL,START-1      ; GET MEMORY SIZE
FFB9 224940     00220         LD      (HIMEM),HL      ; AND SAVE IT
                00230 ;
FFBC C32D40     00240         JP      402DH           ; RETURN TO DOS
                00250 ;
FFBF DD6E03     00260 START   LD      L,(IX+3)        ; GET THE ADDRESS OF
FFC2 DD6604     00270         LD      H,(IX+4)        ; THE CURSOR
FFC5 DA9A04     00280         JP      C,049AH         ; IF READING FROM SCREEN,
                00290                                 ;   THEN RETURN TO ROM
                00300 ;
FFC8 79         00310         LD      A,C             ; GET THE CHARACTER
FFC9 FE7F       00320         CP      RVCODE          ; IF IT'S NOT REVERSE CODE
FFCB 2009       00330         JR      NZ,DISPLY       ;   THEN GO TO "DISPLY"
FFCD 3AEFFF     00340         LD      A,(MASK)        ; GET THE REVERSE MASK
FFD0 EE80       00350         XOR     80H             ; AND TOGGLE IT
FFD2 32EFFF     00360         LD      (MASK),A        ; SAVE THE NEW MASK
FFD5 C9         00370         RET                     ; RETURN WITHOUT DISPLAY-
                00380                                 ;   ING THE CHARACTER
                00390 ;
FFD6 DD7E05     00400 DISPLY  LD      A,(IX+5)        ; IF THE CURSOR
FFD9 B7         00410         OR      A               ; IS ON
FFDA 2801       00420         JR      Z,GETCHR
FFDC 77         00430         LD      (HL),A          ;   THEN BLANK IT
                00440 ;
FFDD 79         00450 GETCHR  LD      A,C             ; GET THE CHARACTER
FFDE FE20       00460         CP      20H             ; IF IT'S A CONTROL CHAR.
FFE0 DA0605     00470         JP      C,0506H         ;   THEN JUMP BACK TO ROM
FFE3 FE80       00480         CP      80H             ; IF IT'S A GRAPHIC CHAR.
FFE5 D2A604     00490         JP      NC,04A6H        ;   THEN JUMP BACK TO ROM
FFE8 3AEFFF     00500         LD      A,(MASK)        ; GET THE INVERSION MASK
FFEB B1         00510         OR      C               ; AND 'OR' IT WITH CHAR.
FFEC C37D04     00520         JP      047DH           ; JUMP BACK TO ROM
FFEF 00         00530 MASK    DEFB    00              ; REVERSE MASK (INITIALLY
                00540                                 ;  SET FOR NORMAL DISPLAY)
                00550 ;
FFB0            00560         END     LOADER          ; AUTO-EXECUTE DRIVER
```

Program Listing 1. Disk based inverse video driver.

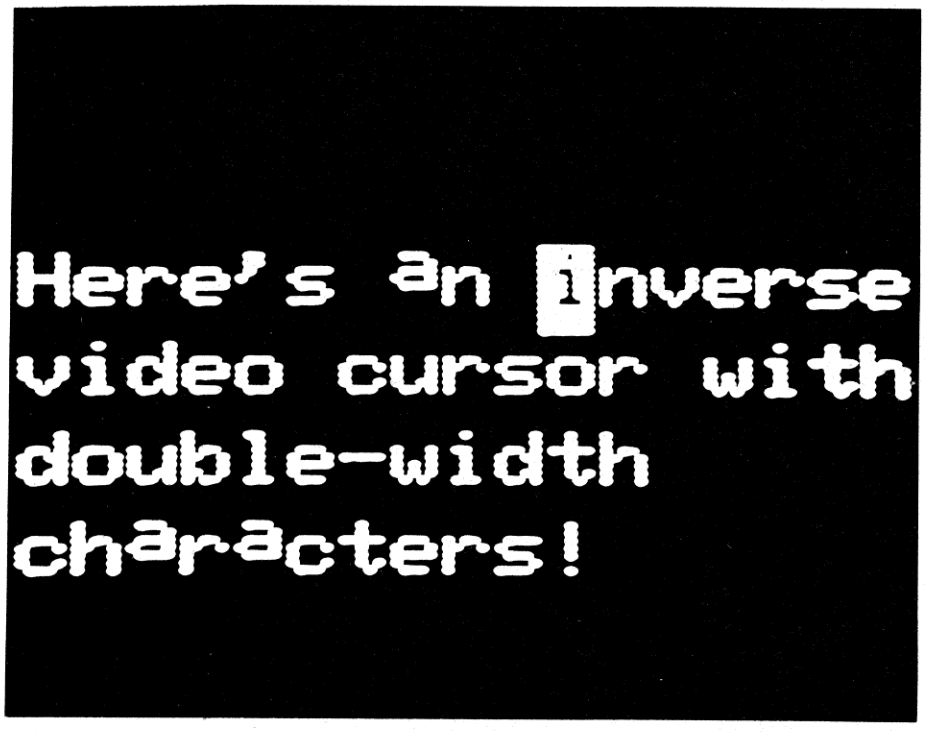


Photo 2

the wire to Z10 on the trace side).

21. Solder a wire from Z42A pin 6 to Z30 pin 3.
22. Solder a wire from Z26A pin 12 to Z26A pin 13.
23. With reference to the schematic, solder a wire from point A on the switch to Z27 pin 3.
24. Solder a wire from point B to Z27 pin 2.
25. Solder a wire from point C to Z26 pin 4.
26. Solder a wire from point D to Z42A pin 2.
27. Solder a wire from point E to Z10A pin 8.
28. Install the switch in its mounting position.

Check your wiring for incorrect connections and solder bridges and then reassemble the case.

Testing

On power up, you should see a normal display. If everything is correct so far, enable your lowercase and run the following BASIC program:

```
10 CLS
20 For I = 0 TO 255
30 POKE I + 15360,I
40 NEXT I
50 GOTO 50
```

You should see the normal alphanumeric character set (with control characters) displayed on the first two lines of the screen. With the switch in the normal position, you will see graphic characters on the second two lines; with the switch in the inverse position, you will see the alphanumeric characters in inverse on the second two lines. If you do not, go back and check your wiring: Something is wrong.

Program Listings 1 and 2 are versions of a machine language inverse video driver, providing lowercase and inverse display. The inverse display is turned on and off with the character code 127, the ASCII DEL character. For example, assuming the display is in normal mode to start with, the following BASIC statement will display "Hello there" in inverse video:

```
PRINT CHR$(127);"Hello there";CHR$(127)
```

The first version is designed for disk users with a disk based assembler. When the program is executed from DOS it automatically links the new video driver into the device control block and sets the DOS memory size (in NEWDOS and TRSDOS 2.2 or later). Therefore, you need not specify the memory size if you enter BASIC with the driver installed, since the DOS memory size is used as the default.

The second version is for Level II 80s and disk users without an assembler. The BASIC program POKEs the driver into high memory and links it into the control block. It also sets the BASIC memory size.

Inverse characters can be used for many purposes. One is to provide a non-destructive cursor for text editors; you can also highlight text, showing important fields in inverse video while the others are in normal video. For other applications, just use your imagination. . . . ■

BYTEWRITER-1

Price Breakthrough from

MICROTEK inc.

✓360

The World's First Under $300 80 Column Dot Matrix Printer

WHY DID IT HAPPEN?

We were approached recently by a man with an idea. He is one of the leading American manufacturers of dot matrix print mechanisms. He had observed, as we had, that in recent months certain foreign printer manufacturers were increasing their share of the low-cost printer market at an alarming rate.

He thought there MUST be a way to fight back. And he was right. We've since formed a working alliance with this manufacturer, and have brought our first joint offering to the market.

HOW DID WE MAKE IT POSSIBLE?

We set out to combine his proven low cost print mechanism with the simplest possible control electronics. Advances in single-chip microprocessor technology and price erosion of components during the last year helped to make this long awaited dream come true – a printer that can be sold for less than half the cost of the computer that drives it. A $299 printer.

But cost-effective designs and efficient manufacturing operations weren't enough. Computer retailers can make up to a $250 markup on the foreign models. Could we hold to a $299 list price and give the dealer enough incentive to sell the Bytewriter-1? No way. We had to try a more direct approach.

YOUR BUY DECISION – DEALER OR MAIL ORDER

There are some very good reasons to buy your first computer through a dealer. There is a certain amount of hand-holding required when you decide to buy a personal computer. This is one of the main functions of the retail computer store. And most of them perform this function very well.

But why would anyone want to buy add-on equipment through a dealer? If you find a product that has been designed for and tested with your particular computer, you can safely bypass the computer dealer. You can have the best of both worlds. You can save money by buying direct from the manufacturer, and you can be certain that your new device will work when you get it.

We've done extensive testing with the most popular computers – the TRS-80, the Apple II, and the Atari 400 and 800. If you own one of these computers, we guarantee you won't have any interface problems with the Bytewriter-1.

TRS-80 is a trademark of Radio Shack, Div. of Tandy Corp.
Apple II is a trademark of Apple Computer, Inc.
Atari 400 & 800 are trademarks of Atari, Inc.
Bytewriter-1 is a trademark of Microtek, Inc.

FOUR THINGS YOU SHOULD KNOW BEFORE YOU BUY THIS PRINTER

We don't want any unhappy customers. We'd like you to know the limitations of our printer, as well as its advantages. There are some differences between the Bytewriter-1 and the higher priced printers you may be looking at:

1) The Bytewriter-1 takes single sheet and roll paper only. No pin feed paper.
2) We've used a 7-wire print head. No fancy lower case descenders.
3) There aren't any software frills in the Bytewriter-1, like VFU controls. However, if your main interest is getting software listings or printing letters, you won't care. And, with a bit of ingenuity, you can provide VFU functions in your own programs.
4) You can't go into a computer store and pick up a Bytewriter-1. They're sold direct only by MICROTEK.

We realize it's unusual to point out the limitations of a product in an ad that promotes it, but we think it's important for mail order buyers to fully understand what they're buying.

The Bytewriter-1 will fill the needs of most people. People who don't see the sense in spending extra money for features they'll never use.

ORDER THE CONFIGURATION THAT'S JUST RIGHT FOR YOU

The Bytewriter-1 is available with an interface cable and complete instructions for use with three of the most popular small computers on the market today, the Apple II, the Atari 400/800, and TRS-80 Models I, II, and III. One of our divisions, MICROTEK PERIPHERALS CORP., can even provide you with the expansion card or module that your computer may require to drive a printer.

CALL OR WRITE TODAY FOR MORE INFORMATION.

We have people standing by to answer your questions.

MICROTEK inc.

Microtek, Inc. ✓362
9514 Chesapeake Drive
San Diego, CA 92123
Tel. 714-278-0633
Outside Calif. call toll free: 800-854-1081
TWX. 910-335-1269

✓See List of Advertisers on page 306

An analysis program for geodesic dome design.

Dome Time

Daniel B. Nickell
206 Jill Lane #2
Laurel, MD 20810

In the early 1960's there was a push forward in experimentation with geodesic domes as a form of housing and shelter.

First patented in 1951 by Buckminster Fuller, the geodesic dome offers an attractive combination of low cost, high structural strength and energy efficiency. The first domes, however, suffered from some nagging practical problems which kept the concept from wide acceptance.

Today, most of the problems—mainly sealing the dome against leaks—have been solved and a number of companies are offering a full range of dome designs. For those that are interested in working up their own designs the following program may be of some use.

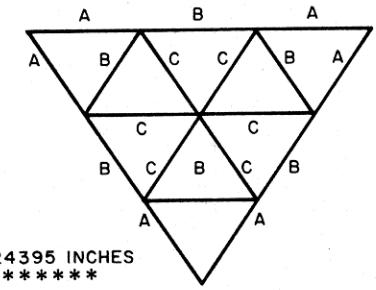
Dome Theory

The basic theory of geodesic domes is that a sphere, or a portion of one, is the most efficient container of a given volume and is also the strongest; that is, the shape tends to distribute forces applied to it evenly over the entire surface.

The geodesic is an attempt to provide a practical solution to the construction problem of building a sphere in an industry using straight-edge technology. By fastening together a number of triangles, Fuller illustrated a structure that resembles a sphere and can be built with the existing technology. Fuller also discovered that the greater the number of triangles involved, the closer the structure approaches spherical proportions and qualities.

This program provides the basic data required for constructing a dome called a "Three-Frequency Icosahedron." It is a very simple, yet functional geodesic.

All you need supply is the diameter of the sphere upon which the dome will be based and the scale of the model to be built. You should also know whether the dome is to be a 3/8, 1/2, or 5/8-dome. This means, what portion of the sphere is to be used as the structure: 3/8, 1/2 or 5/8. A 3/8-dome is the cheapest to build as it requires the least amount of materials. The 5/8 offers the greatest interior space and the most efficient use of that space. The 1/2-dome is a good compromise between two.



1.24395 INCHES
A ********

1.43996 INCHES
B *********

1.47159 INCHES
C **********

Fig. 1. Construction Triangle.

The program first asks whether you want to use a line printer for part of the output. This listing was written with the Heath H-14 line printer in mind. If you are using another, you'll have to make some adjustments, mainly in lines 1000-1060, to print the scale correctly. If you don't have a printer, delete these lines entirely.

Next, the computer will ask for data. First, enter the diameter or the square footage of the floor. If you enter the square footage first, the computer defaults to the 1/2-dome variety. If you specify a diameter, you will then be asked to select the variety of dome (3/8, 1/2 or 5/8) before the area and volume computations are made. By playing with these input variables, you can decide on the proportions best suited to your purpose.

The computer takes care of the rest. The first output displayed is the full scale dome data. Review it. If it fits your needs, then type C and INKEY$. Otherwise, type R INKEY$, and reset the input data until you are satisfied. Table 1 shows the sample output for a 4/8 (1/2) dome with a desired floor space of 640 square feet.

Continuing, the computer then asks for the type of scale you want to use. The first, A, is generally used by architects and home designers. Some minor program modifications are necessary if you want to work in metric dimensions. The second type of scale, B, is used frequently by model builders. One-half-scale is just that—the model is one-half of the acutal size. You can use metric dimensions in this scale with only two changes to the program: Adjust the labels to match, and change line 460 so SF=(100*SN)/SD instead of SF=(12*SN)

These Figures are For a 4/8ths Geodesic Dome, 28.546 Feet in Diameter.

Height Of Dome	= 14.273 Feet
Surface Area Of Dome	= 1280 Square Feet
Volume Of Dome	= 6089.82 Cubic Feet
Area Of Floor Within	= 640 Square Feet
Radius Of Floor	= 14.273 Feet

C To Continue, R to Readjust Input Data

Table 1. Summary of Dome Statistics.

These Figures are For a Model Of a 4/8ths Geodesic Dome.
The Diameter Of The Model Dome is 7.1365 Inches.
Scale Used To Obtain These Data: 1" = 4'

Height of the Dome Model	= 3.56825 Inches
Surface Area of the Model	= 80 Square Inches
Volume of Model	= 95.1534 Cubic Inches
Area of Model Floor	= 40 Square Inches
Radius of Model Floor	= 3.56825 Inches

Hit ENTER When Ready to Proceed.?

Table 2. Model Statistics

/SN. The conversion will then be from meters to centimeters, instead of from feet to inches.

I use a scale of one inch equals four feet. Graph paper with quarter-inch line spacing is readily available and each block therefore equals one square foot. The sample output in Table 2 is based on this scale. These data refer directly to the model of the dome. You can use these in the construction of the model.

Chord Length

The next display represents the lengths of the three different chords you will need to build the geodesic frame. Assuming your TRS-80 monitor is properly aligned, the length of the chords should be accurate to about 1/16th of an inch of the calculated length. If the chord is longer than about 7.2 inches, the program will reduce the display to show the *relative* sizes of the chords, not the actual. In this instance, the display will tell you the degree of reduction and you would have to use your own measuring device to lay out the lengths.

If you are using a line printer, all of the above information will have been printed out by this time. Using the asterisk on the H-14 printer results in the same level of accuracy—about 1/16 or 1/17th of an inch. If you use a different make of printer or use a different character you will have to experiment to find the correct scaling factors in line 760. See Table 3.

The next display (Fig. 1) repeats the chord lengths and draws a basic construction triangle. You can refer to this for the proper relationship of the various chords. Typing an @ at this point will enable you to access the drafting aid subroutine. This subroutine allows you to convert a measurement from either scale to real or from real to scale. From this subroutine you can either return to the previous graphic, recompute another conversion, or terminate the program. See Table 4.

If you are handy with assembly language, try adding a USR(0) subroutine to speed up some of the graphics displays. Yet, for the most part, the existing program is fast enough. The program requires about 9500 bytes, which should leave enough room for user-designed additions or modifications to the program.

With very few exceptions, the line numbering in the program is in increments of 10. I omitted the first 89 titling lines. Lines that end with a five—except 255 and 395, which were added while preparing the article to speed up its operation and tidy up program logic—can also be omitted. I used INKEY$ routines where possible and practical to ease data entry. ■

```
Are you converting from (S)cale to real
or from (R)eal to scale? R
Enter known value? 15
The scale value of 15 feet = 3.75 inches
(G)raphics, (E)nd, or (C)onversion help E
(screen clears)
(R)epeat to see these data again, (A)nother dome
data set, or (E)nd to end program. E.
(screen clears)
Good luck with your project.
Remember that the values shown for the struts
are total length struts. If you are using hubs, be
sure to subtract the proper amount from the strut
so the overall length is not greater than shown in
this program.
Thanks for using geodesics.
Ready
```

Table 4.

Data for the construciton of a model of a geodesic dome (3-frequency alternate). Refer to 'The Domebook 2', published in 1972, by Shelter Publications.

UNIT	REAL (IN FEET)	MODEL (IN INCHES)
Height of Dome	37.5000	9.3750
Surface Area of Dome	7068.5800	441.7870
Volume of The Dome	77312.7000	1208.0100
Area of Floor	2650.7200	165.6700
Radius of Floor	29.0474	7.2618

Scale of Model: 1 Inch Scale = 4 Feet Real.

Chord 'A' = 2.61462 Inches.
A **********

Chord 'B' = 3.02661 Inches.
B **********

Chord 'C' = 3.09309 Inches.
C **********

Table 3. Conversion Data Showing Chords.

NEW EDUCATIONAL PROGRAMS for the TRS-80*

You can now order reading programs for
READING COMPREHENSION- ECONOMICS- PHYSICS- MATH-AUTO MECHANICS- HISTORY
2 FULL LENGTH PROGRAMS only $9.90 (one cassette)
16 PROGRAM COURSE only $77.00 (8 cassettes)

Order by checking the desired programs:

*Reading Comprehension
☐ Cd 1 Cd 2 $9.90
☐ Cd 3 Cd 4 $9.90
*12 more Cd's available

*Auto Mechanics
☐ Ka 1 Ka 2 $9.90
☐ Ka 3 Ka 4 $9.90
*12 more Ka's available

☐ Physics 1 Physics 2 $9.90
☐ Economics 1 Economics 2 $9.90
☐ History 9 History 10 $9.90
☐ 2 Demo programs and Catalogue $9.90

Utilize with any Model I, Level I or Level II, 4K and 16K or any Model III. Displays lower case if you have it.

*TRS-80 IS A TM OF TANDY CORP.

I have enclosed a total of _____. $9.90 for each 2 program cassette ordered plus $.50 per cassette for shipping/handling to:

DORSETT ✓314
Educational Systems, Inc.
P.O. Box 1226, Norman, Ok. 73070

Name _____
Address _____
City _____ State _____ Zip _____

PRICE CRASH

16K DYNAMIC RAMS FOR
$24.50

Volume buying does it again: these are top quality, high speed, low power RAMs suitable for expanding memory in TRS-80* I/II/III and Color Computers, Heath H89, Apple, newer PETs, etc. Backed by one year limited warranty. Add $3 for two dip shunts and conversion instructions for TRS-80* I.

*TRS-80 is a trademark of the Tandy Corporation

Why pay more
. . .we stock the right parts at the right price.

Terms: Cal res add tax. Allow at least 5% shipping; excess refunded. VISA® Mastercard® orders call (415) 562-0636, 24 hours. Include street address for UPS delivery. Prices subject to change without notice.

✓75

GODBOUT
GODBOUT ELECTRONICS
BOX 2355, OAKLAND AIRPORT, CA 94614

THE GREEN SCREEN THING

(The Green Thing is custom design to fit your TRS-80. It mounts in seconds without any tools.)

AVAILABLE: For models I, II, and III as well as any standard 12 inch monitor.

List $7.95 (Add $1.00 for shipping & handling, and California residents add 6% sales tax.)

FEATURES:
- Improved image contrast
- Reduces eye fatigue
- Enhances screen legibility
- Decreases glare
- Gives system a professional look

ORDER NOW
24 HOUR
PH 408-946-1265

AVS ✓146 AUDIO - VIDEO SYSTEMS
2485 Autumnvale Dr. San Jose, CA. 95132

JOY·6

THE ULTIMATE JOYSTICK INTERFACE FOR YOUR TRS-80*

Don't be left out. The best action and simulation games require smooth, clean, jitter free joystick control. That's what you get with **JOY-6**, and more!

- 2 joysticks with pushbuttons for fast action.
- Sound effects capability. Great for space games.
- Simple software control—write your own programs.
- Manual—schematic, theory of operation, software.
- 2 additional A to D channels for game paddles, sensors.

PLUS: "Joypak-1"—A 16K L2 cassette with 6 fascinating new games — **SOLO, FRENZY, WIPEOUT, DOODLE, ENDPLAY** and... **BLOCKADE** — an action and strategy game with 9 levels of difficulty. Try to break through your opponent's defenses. But watch out! While the enemy is rebuilding his blockade, he's destroying yours! Games can last for seconds or hours.

SPECIAL INTRODUCTORY OFFER! *ALL THE ABOVE, PLUS POWER SUPPLY—ASSEMBLED, TESTED, READY TO PLAY* ONLY **$99.95**
COMPLETE KIT—ONLY **$84.95** QUALITY GUARANTEED

MEGA systems INC. ✓272
262 PARK LANE
KING OF PRUSSIA, PA 19406

PHONE ORDERS WELCOME
215-337-3876
C.O.D., CHECK, M.O., M.C., VISA
Add $2.00 postage & handling
Pa. Res. add 6% tax
*TRS-80 is a Trademark of Tandy Corp.

its...

SOFTWARE for the 80's

Programs for the full line of TRS-80* Microcomputers

MODEL I - Level II and DISK
I/O Utility, Inventory
Machine Language Retrieval

MODEL II - Reading Aids

MODEL III - Retrieval
I/O Utility
Machine Language Aids

COLOR - Games for Everyone
Quick Tac Toe
Asteroid Pilot & Tag

POCKET - Traveling Salesperson
Weight Forecasting
Estimating

"Introduction to NEWDOS"
A New manual for users of the preferred DOS
get more from COPY, CMD, REF, RENUM, LMOFFSET, etc.
ONLY $5.95 Including postage (US & Canada)

Order your 1981 Catalog NOW!
its...
Information Technology Systems
POB 2667 Sarasota FL 33578
(813) 366 - 0064

*TRS-80 is a trademark of Radio Shack, a Tandy Corporation

Program Listing

```
90 CLEAR 1000
100 PI=3.1415926535
110 CLS:PRINT"          ******  GEODESIC MODELS  ******"
115 'INPUT DATA
120 PRINT@192,"SO YOU ARE GOING TO BUILD A GEODESIC MODEL ARE YOU?
    "
130 PRINT:PRINT"(WILL YOU NEED THE LINE PRINTER?  (Y OR N))"
140 Q$=INKEY$:IFQ$=""THEN140ELSE150
150 IF Q$="Y"THENLP=1ELSELP=0:IF LP=1THEN160ELSE180
160 LPRINT" ":LPRINT"DATA FOR THE CONSTRUCTION OF A MODEL OF A GEO
    DESIC DOME (3-FREQUENCY ALTERNATE).  REFER TO 'THE DOMEBOOK 2
    ', PUBLISHED IN 1972, BY SHELTER PUBLICATIONS."
170 LPRINT" "
180 CLS:PRINT"WELL, THIS PROGRAM WILL HELP YOU A LITTLE BIT.  FIRS
    T,
WE WILL NEED TO THE HOW LARGE THE DOME WOULD BE IN 'REAL'
    LIFE.
THEN, WE WILL NEED TO KNOW HOW MUCH SMALLER THE MODEL W
    ILL BE."
190 PRINT:PRINT"IF YOU DON'T KNOW THESE VALUES, THE COMPUTER WILL
    WAIT
WHILE YOU GET THEM.  IF YOU HAVE THEM, HIT ENTER.":INPUT
    XX
195 'THE FOLLOWING PROCEDURES ASSUME ALL MEASUREMENTS ARE IN UNITS
     OF FEET AND INCHES (DECIMAL).  TO USE METRIC, SIMPLY CHANGE

    THE LABELS IN LINES 340-380, 450, 500, 520-570, AND 700.
200 CLS:PRINT@192,"NOW THAT YOU'RE READY, GIVE ME TWO VALUES:"
210 PRINT:INPUT"FIRST, THE DIAMETER OF THE DOME OR THE
SQUARE FOOT
    AGE OF THE DESIRED FLOOR";A
220 PRINT:PRINT"NOW TELL ME WHETHER";A;"IS THE
(D)IAMETER OR THE (
    S)QUARE FOOTAGE:"
230 A$=INKEY$:IF A$=""THEN230ELSEIFA$="S"THEN255ELSE240
240 PRINT:PRINT"AS YOU KNOW, DOMES ARE CLASSED AS EITHER 3/8, 1/2
    (OR 4/8), OR 5/8 DOMES.  BY USING THE NUMERATOR (USING 4 FOR
    1/2),
INDICATE THE FORM DESIRED:";F$
250 F$=INKEY$:IFF$=""THEN250ELSE260
255 F$="4"
260 F=VAL(F$):IFF=4THENZ=2ELSEZ=1.93649
270 IF F=3ORF=4ORF=5THEN280ELSE240
280 IF A$="D"THEN290ELSE300
285 'COMPUTATION OF "REAL-LIFE" DOME STATISTICS
290 D=A:R=D/2:AB=Z*R:AF=PI*((AB/2)[2):GOTO310
300 AF=A:AB=2*(SQR(AF/PI)):R=AB/Z:D=2*R
310 DH=D*(F/8):DS=2*PI*DH*R:DV=(PI*(DH[2)*((3*R)-DH))/3
320 CLS:PRINT"SUMMARY OF DOME STATISTICS..."
330 PRINT@192,"THESE FIGURES ARE FOR A"F;"/8THS GEODESIC DOME,";D;
    "FEET IN
DIAMETER.
340 PRINT:PRINT"HEIGHT OF DOME                    =  ";DH;" FEET"
350 PRINT"SURFACE AREA OF DOME            =  ";DS;" SQUARE FEET"
360 PRINT"VOLUME OF DOME                  =  ";DV;" CUBIC FEET"
370 PRINT"AREA OF FLOOR WITHIN            =  ";AF;" SQUARE FEET"
380 PRINT"RADIUS OF FLOOR                 =  ";AB/2;" FEET"
390 PRINT:PRINT"'C' TO CONTINUE, 'R' TO READJUST INPUT DATA";
395 Q$=INKEY$:IFQ$=""THEN395ELSEIFQ$="R"THEN200ELSE400:'ROUTINE TO
    SET SCALE OF MODEL
400 CLS
410 PRINT@192,"NOW WE NEED THE SCALE OF YOUR MODEL.   SCALES ARE E
    XPRESSED
AS:       A  --  1 INCH SCALE = X FEET REAL

    B  --  THE MODEL IS A FRACTION OF THE REAL (1/2, 1/4)
420 PRINT:PRINT"SELECT THE TYPE SELECT YOU ARE READY TO INPUT:"
430 S$=INKEY$:IF S$=""THEN430ELSE440
440 IF S$="A"THEN450ELSE460
450 CLS:PRINT@192,"1 INCH IN THE SCALE WILL EQUAL HOW MANY FEET IN
     REAL LIFE?":INPUTS:SF=1/S:GOTO470
460 CLS:PRINT@192,"WHAT IS THE NUMERATOR OF YOUR SCALE FRACTION?":
```

Program continues

:::ULTRADOS:::ULTRADOS:::ULTRADOS:::ULTRADOS:::ULTRADOS:::

:::ANOUNCING THE LATEST REVISION!:::

:::FASTER AND EVEN MORE POWERFUL THAN BEFORE!:::

A TREMENDOUS USER RESPONSE AND FEEDBACK FROM THE FIRST 2000 COPIES ISSUED HAS PROVIDED THE VALUABLE INFORMATION WE NEEDED TO DETERMINE THOSE FEATURES MOST WANTED, THEY ARE INCLUDED IN THIS REVISION.

THE SUCCESS OF ULTRADOS IN THE MARKET PLACE ALSO ALLOWS US TO REDUCE IT'S PRICE, INSTEAD OF $119.95, THE FULL BLOWN VERSION IS YOURS FOR ONLY $94.95!

OTHER USER INPUT POINTS OUT THAT SOME OF OUR CUSTOMERS DO NOT NEED OR USE ALL OF THE SOPHISTICATED PROGRAMMING UTILITIES INCLUDED IN THE SYSTEM, CONSEQUENTLY WE ARE RELEASING A SECOND VERSION WITH SOME OF THEM REMOVED, AT JUST $59.95!

:::ALSO ANNOUNCING ULTRA UTILITIES:::

BOSS 2.2 - $24.95c $29.95d Basic operated single stepper, a monitor for basic programs, a must for all basic programmers.

VFU - $19.95c $24.95d Visual file utility, single key commands will COPY or PURGE disk files, EXECUTE will load and execute both machine language and basic programs, use the 4 arrow keys to position cursor to the selected file.

UZ - $19.95c $24.95d ULTRA ZAP the super disk zap utility from ULTRADOS.

SPOOL - $19.95c $24.95d Parallel port printer spooler, define the buffer size, lines per page, and characters per line, returns use of the CPU while printing is done. Don't confuse this spooler with others that use a disk file, this one spools into RAM memory!

GEDIT - $19.95c $24.95d Global Editor, that's right folks a global editor for basic programs! Allows fast global search and replace of anything in a Basic program, even key words, will create those super fast string packed graphics!

LC - $5.95c Lower case driver, supports all known LC mods, allows typewriter keyboard function, only 68 bytes long.

EP - $5.95c Epson MX-80 printer driver, allows you to use all the features of this fine little printer including graphics.

RENUM-80 - $5.95c Renumber for tape and disk systems, super fast, fail safe operation.

:::ULTRADOS:::ULTRADOS:::ULTRADOS:::ULTRADOS:::ULTRADOS:::

:::LAST MINUTE ITEMS OF INTEREST:::

*** ALL MPI DISK DRIVE PRICES REDUCED, CHECK IT OUT!!!

*** WE ARE SHIPPING MOD III's WITH DRIVES, DO YOU HAVE YOURS?

*** USED LEVEL II's, DRIVES, PRINTERS, ETC. IN STOCK!!!

*** WE HAVE THE BEST MOD III SOFTWARE SELECTION AROUND!

*** WE TAKE HARDWARE TRADE-INS, AND OFFER HIGHEST ALLOWANCES!

*** TWO TECHNICIANS ON STAFF FOR FAST RELIABLE LOW COST SERVICE

** YOUR
ONE STOP
COMPUTER
SHOPPING
SOURCE **

LEVEL IV PRODUCTS INC. ✓14
32461 SCHOOLCRAFT RD.
LIVONIA, MICHIGAN 48150
313-525-6200 (in state)
800-521-3305(toll free)

LEVEL IV PRODUCTS

"A PERFECT CLOAD EVERY TIME"

From a review in the September-October 1980 Elementary Electronics

$64.95

Alphanetics TRS-80 TAPE DIGITIZER available without cassette remote on/off switch for $59.95

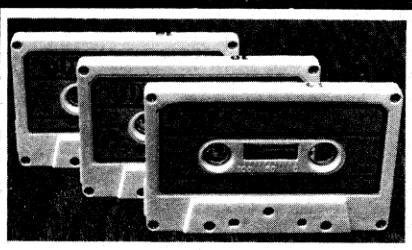
- Eliminates cassette loading & copying problems ... even SYSTEM tapes!
- Makes tape program loading virtually independent of volume control setting!
- Makes perfect digital copies of any tape without using computer, removing hum, noise, & cures minor dropouts!
- Cassette switch allows manual control of cassette recorder.
- "Good Data" indicator easily enables setting proper volume ... doubles as a tape monitor!
- A.C. powered - no batteries to replace!
- Compatible with Level I & II.
- Feed your cassette to the TAPE DIGITIZER and feed your computer the exact digital waveform the TRS-80 gave to the tape!
- Get rid of your tape bugs today - $64.95 postpaid or return within 10 days for a full refund!

ALPHANETICS ✓124

P.O. BOX 597 FORESTVILLE, CA 95436

master charge **24 hr. phone (707) 887-7237** VISA

MICRO-80™ CASSETTES— 100% ERROR-FREE



LENGTH	12 PACK	24 PACK
C-10.....	69¢	59¢
C-20.....	89¢	79¢

- Fully Guaranteed!
- World's Finest Media
- Premium 5-Screw Construction
- Used by Software Firms Nationwide
- Dealer and Club Discounts Available
- Custom Storage Case, Add 19¢ Each
- Shipping Charges, Add $1.50 ✓476

μ80™ MICRO-80™ INC.

E-2665 NO. BUSBY ROAD

OAK HARBOR, WA 98277


```
INPUTSN:PRINT:INPUT"WHAT IS THE DENOMINATOR OF THE FRACTION";
SD:SF=(12*SN)/SD:S=1/SF
465 'COMPUTATION OF MODEL STATISTICS
470 RM=R*SF:DM=D*SF:HM=(F/8)*DM:SM=2*PI*HM*RM:VM=(PI*(HM[2)*((3*RM
     )-HM))/3
480 RF=(Z*RM)/2:FM=PI*(RF[2)
490 CLS:PRINT"MODEL STATISTICS"
500 PRINT@192,"THESE FIGURES ARE FOR A MODEL OF A";F;"/8THS GEODES
     IC DOME.
THE DIAMETER OF THE MODEL DOME IS";DM;"INCHES.
SCALE
      USED TO OBTAIN THESE DATA: 1''=";S;"'"
510 PRINT
520 PRINT"HEIGHT OF THE DOME MODEL       =  ";HM;" INCHES"
530 PRINT"SURFACE AREA OF THE MODEL      =  ";SM;" SQUARE INCHES"
540 PRINT"VOLUME OF THE MODEL            =  ";VM;" CUBIC INCHES"
550 PRINT"AREA OF MODEL FLOOR            =  ";FM;" SQUARE INCHES"
560 PRINT"RADIUS OF MODEL FLOOR          =  ";RF;" INCHES
570 IF LP=1 THEN580ELSE680
580 LPRINT"UNIT                           REAL (IN FEET)          MO
     DEL  (IN INCHES)
590 B$="########.####          ########.####"
600 LPRINT" "
610 LPRINT"HEIGHT OF DOME                ";:LPRINTUSINGB$;DH;HM
620 LPRINT"SURFACE AREA OF DOME          ";:LPRINTUSINGB$;DS;SM
630 LPRINT"VOLUME OF THE DOME            ";:LPRINTUSINGB$;DV;VM
640 LPRINT"AREA OF FLOOR                 ";:LPRINTUSINGB$;AF;FM
650 LPRINT"RADIUS OF FLOOR               ";:LPRINTUSINGB$;AB/2;RF
660 LPRINT" ":LPRINT"SCALE OF MODEL:  1 INCH SCALE =";S;"FEET REAL
     .":LPRINT" "
670 GOTO690
680 PRINT:INPUT"HIT 'ENTER WHEN READY TO PROCEED.";XX
690 CLS:PRINT"THIS PROGRAM IS ONLY DESIGNED TO GIVE YOU THE NECESS
     ARY VALUES
WITH WHICH TO BUILD A '3-FREQUENCY ALTERNATE' DOME
     .  IF YOU NEEDTO BUILD A DOME OF A DIFFERENT FREQUENCY, PLEAS
     E REFER TO PAGE
109 OF THE DOME BOOK."
700 PRINT:PRINT"FOR THIS DOME TYPE YOU NEED STRUTS OF THREE DIFFER
     ENT LENGTHS.
SHOWN BELOW ARE THE THREE LENGTHS AND THE NUMERI
     CAL VALUES, IN
DECIMAL INCHES.  THE SCALE USED IS 1''=";S;"'"
710 PRINT
715 'ROUTINE TO COMPUTE LENGTH OF STRUTS
720 Z=14.69573444
730 A=.34861548:B=.40354821:C=.41241149
740 AC=A*RM:BC=B*RM:CC=C*RM
750 AI=INT((AC*32)/2)+7:BI=INT((BC*32)/2)+7:CI=INT((CC*32)/2)+7
760 AK=INT(AC*16.6666666):BK=INT(BC*16.6666666):CK=INT(CC*16.66666
     66)
770 FF=1
775 'ROUTINE TO ADJUST DISPLAY TO FIT SCREEN
780 IF AI>115 OR BI>115 OR CI>115THEN810ELSE790
790 GOSUB870
800 GOTO970
810 AI=AI/2:BI=BI/2:CI=CI/2:FF=FF*2:AK=AK/2:BK=BK/2:CK=CK/2
820 GOTO780
825 'GRAPHIC DISPLAY OF STRUTS ON MONITOR
870 FOR I=8 TO AI
880     SET (I,34)
890 NEXT I
900 FOR J=8 TO BI
910     SET (J,40)
920 NEXT J
930 FOR K=8 TO CI
940     SET (K,46)
950 NEXT K
960 RETURN
970 IF FF>1THEN980ELSE1010
980 PRINT@576,"SCREEN TOO SMALL, CHORDS SHOWN ARE 1/";FF;"OF PROPE
     R SCALE SIZE."
990 IF LP=1THEN1000ELSE1010
1000 LPRINT"PAGE WIDTH TOO NARROW, CHORDS SHOWN ARE 1/";FF"OF PROP
     ER SCALE SIZE.":LPRINT" "
```

Program continues

```
1010 PRINT@705,"A";:PRINT@646,"CHORD 'A' =";AC;"INCHES";
1020 PRINT@833,"B";:PRINT@774,"CHORD 'B' =";BC;"INCHES";
1030 PRINT@961,"C";:PRINT@902,"CHORD 'C' =";CC;"INCHES";:IF LP=1TH
     EN1040ELSEINPUT"   'ENTER' TO CONTINUE.";XX
1040 IFLP<>1THEN1080ELSELPRINT" ":LPRINT"CHORD 'A' =";AC;"INCHES."
     :LPRINT"  A  ";:LPRINTSTRING$(AK,42):LPRINT" "
1050 LPRINT" ":LPRINT"CHORD 'B' =";BC;"INCHES.":LPRINT"  B  ";:LPR
     INTSTRING$(BK,42):LPRINT" "
1060 LPRINT" ":LPRINT"CHORD 'C' =";CC;"INCHES.":LPRINT"  C  ";:LPR
     INTSTRING$(CK,42)
1070 LPRINTSTRING$(5,10)
1080 IF LP<>1THEN1090ELSEINPUT"    'ENTER' TO CONTINUE.";XX
1090 GOTO1180
1100 CLS:PRINT@512,"(R)EPEAT TO SEE THESE DATA AGAIN, (A)NOTHER DO
     ME DATA SET,
OR (E)ND TO END PROGRAM."
1110 Q$=INKEY$:IFQ$=""THEN1110ELSE1120
1120 IF Q$="R"THEN490ELSEIFQ$="A"THEN200ELSEIFQ$="E"THEN1130ELSE11
     20
1130 CLS:PRINT@256,"GOOD LUCK WITH YOUR PROJECT.

REMEMBER THAT TH
     E VALUES SHOWN FOR THE STRUTS ARE TOTAL LENGTH
STRUTS.  IF YO
     U ARE USING HUBS, BE SURE TO SUBTRACT THE PROPER
AMOUNT FROM
     THE STRUT SO THE OVERALL LENGTH IS NOT GREATER THAN"

1140 PR
     INT"SH
OWN IN THIS PROGRAM."
1150 PRINT:PRINT"THANKS FOR USING GEODESICS."
1160 END
1170 'MEMORY REQUIRED IS ABOUT 8100 BYTES
1180 CLS
1190 GOSUB870
1195 'ROUTINE TO DRAWN BASIC TRIANGLE ON MONITOR
1200 FORY=4TO43
1210    X1=INT((Y-4)*1.2307694)
1220    X2=127-X1:X3=X1+32:X4=X2-32:X5=X1+64:X6=X2-64
1230    SET(X1+31,Y):SET(X2,Y)
1240    IFX3<(X2-31)SET(X3+31,Y)
1250    IFX5<(X2-31)SET(X5+31,Y)
1260    IFX4>(X1+31)SET(X4,Y)
1270    IFX6>(X1+31)SET(X6,Y)
1280 NEXTY
1290 Y=4:FORX=32TO127:SET(X,Y):NEXTX
1300 Y=17:FORX=48TO111:SET(X,Y):NEXTX
1310 Y=30:FORX=64TO95:SET(X,Y):NEXTX
1320 PRINT@24,"A";:PRINT@40,"B";:PRINT@56,"A";:PRINT@209,"A";:PRIN
     T@218,"B";:PRINT@229,"C";:PRINT@234,"C";:PRINT@245,"B";:PRINT
     @250,"A";
1330 PRINT@483,"C";:PRINT@492,"C";:PRINT@705,"A";:PRINT@833,"B";:P
     RINT@961,"C";
1340 PRINT@416,"C";:PRINT@431,"C";:PRINT@538,"B";:PRINT@566,"B";:P
     RINT@616,"B";:PRINT@801,"A";:PRINT@813,"A";
1350 PRINT@646,AC;" INCHES";:PRINT@774,BC;" INCHES";:PRINT@902,CC;
     " INCHES";
1360 PRINT@1000,"'@' FOR DRAFTING HELP";
1370 Q$=INKEY$:IFQ$=""THEN1370
1380 CLS
1390 CLS:PRINT@192,"ARE YOU CONVERTING FROM (S)CALE TO REAL

OR FR
     OM (R)EAL TO SCALE?";
1395 'DRAFTSMAN'S AID
1400 C$=INKEY$:IFC$=""THEN1400
1410 PRINT:PRINT:INPUT"ENTER KNOWN VALUE";KV
1420 IFC$="S"THEN1480
1430 PRINT:PRINT"THE SCALE VALUE OF";KV;" FEET  =";KV*SF;" INCHES"
1440 PRINT:PRINT"(G)RAPHICS, (E)ND,   OR  (C)ONVERSION HELP"
1450 S$=INKEY$:IFS$=""THEN1450
1460 IFS$="G"THEN1180ELSE1470
1470 IFS$="E"THEN1100ELSE1390
1480 PRINT:PRINT"THE REAL VALUE OF";KV;" INCHES =";KV/SF;" FEET"
1490 GOTO1440
1500 END
```


NEW PROGRAMS FOR THE TRS-80

INCOPROP

Income Property Analysis for the TRS-80

INCOPROP: Based upon standardized methods of property analysis used throughout the real estate industry. Generates a 3 page report containing an annual property operating statement and a comprehensive 10 year cash flow analysis. Contains I.R.S. tax table to project after-tax income stream and investor's I.R.R.

- Handles 5 different methods of tax depreciation.
- Handles up to 3 loans & 3 different type loans.
- Highly interactive format permits "Sensitivity Analysis".
- Disk files created for permanent storage of data.

Minimum system requirements: 32k RAM, 1 drive and printer. Sold with informative 78 page user's manual covering basic aspects of income property investment & 50 data worksheets.

Model I & III: on cassette for easy transfer to disk $120.00
Model II: on 8-inch diskette $145.00
Model II: Version available in MBASIC running under CP/M $165.00

New!

MAINDEX: An easy-to-use program to aid you in the indexing of your files on disk. Can't find that program you wrote last month? Put your computer to work! Find any program or data file in your system in seconds.

- A Main Index of all your other disk's directories.
- Alphabetizes list of files and gives you names, grans used, dates written, tracks and file descriptions.
- Sorts Files by name, disk, and categories.
- File descriptions can be searched for key words.
- Prints disk labels with disk name and file names.
- Uses all the advanced and extremely fast file manipulation capabilities of Apparat, Inc.'s NEWDOS/80.

Requires Level II, 48K, 1 disk drive and NEWDOS/80. on cassette for easy transfer to disk $20.95

VISA ✓5 MasterCard

TRS-80 IS A TRADEMARK OF TANDY CORP • NEWDOS/80 IS A TRADEMARK OF APPARAT INC • CP/M IS A TRADEMARK OF DIGITAL RESEARCH INC

EZ SOFT WARE

DEPT EM, PO BOX 591, NOVATO, CA 94947

Little Bee EDUCATIONAL PROGRAMS

For TRS* 80 Level II 16 K CASSETTE

Upper/Lower Case Matching K-1
Provides a drill to associate upper case letters to corresponding lower case letters. $9.95

ABC sequence K-1
Marching letters reinforce alphabet sequence. $9.95

Listen and Spell (Wh-Th Words) 2-4
Provides drill for troublesome Wh-Th words. $9.95

Calendar Tic-Tac-Toe 2-4
Provides drill on sequence of months and days including current day and month for one or two students. $14.95

Math Facts K-6
Teacher selectable drill for math facts. Teacher selects +, −, ×, ÷ and limits. $9.95

Contractions 2-4
Drill for students to provide the two words that make up contraction. $9.95

Self correcting and scoring, positive reinforcement

*Trademark of Tandy Corp.

Little Bee EDUCATIONAL PROGRAMS ✓208
P.O. Box 262 Massillon, Ohio 44646

✓See List of Advertisers on page 306

Re-ink, and long line printer ribbons!

Keep It in the Black

William D. Johnston
1808 Pomona Dr.
Las Cruces, NM 88001

Microcomputer users who own hard copy printers have always appreciated the crisp and easy-to-read print produced when a new ribbon is installed.

The ability of a fabric printer ribbon to maintain this quality is really short-lived, however, since many ribbons have a useful life of no more than 16 to 20 hours. And the print quality, of course, deteriorates even before the ink is all gone.

I was doing some work one day on a microcomputer driving an LA36 DECwriter. The printer ran continuously. To keep up acceptable print quality, it was then necessary to change the ribbon at least once a day, sometimes twice. At $5.00 per ribbon, there had to be a better way.

My old Model 15 Teletype machine runs several hours a day, printing continuous wire service news bulletins, National Weather Service broadcasts and ham radio transmissions. In the past ten years I've changed the ribbon twice. Nevertheless, it always prints nice, dark characters.

The secret is a clever little device which automatically re-inks the ribbon as it advances from one spool to the other during normal printing. All that is necessary is to replace the ink supply once every few weeks. The nylon ribbon is replaced only when the fabric is worn out.

The re-inking device on the Model 15 was manufactured especially for that machine. As far as I know, no device has ever been made for microcomputer printers, so it was worth it to see if the Model 15's re-inker could work on the DECwriter. I just designed a mounting bracket that wouldn't interfere with the DECwriter's moving parts, and the old Model 15 re-inker worked perfectly.

Mounting and Operation

Photo 1 shows a typical re-inker kit before installation. Although several different models exist, they have a bracket with a small, permanently mounted ball-bearing assembly. An inkwell snaps into the bearing. The inkwell itself has a threaded cap, and the ink feeds by capillary action through tiny holes into the felt bands that surround it. The mechanism is mounted so that the ribbon passes around the inkwell and picks up the ink from the felts whenever the printer is in operation.

An actual installation is shown in Photo 2. The printer illustrated is an LA36 DECwriter, and the re-inker was mounted without drilling holes or making modifications to the printer. It can easily be restored to its original condition.

A thin metal bar was bolted to the original re-inker bracket/bearing assembly, and the bar, in turn, was clamped to the printer chassis. Fabrication and installation took less than ten minutes. Note that this is a slightly different model of re-inker kit than the one in Photo 1, and the mounting method must be altered, depending on the model used.

By making a suitable bracket, these re-inkers can be used on any printer that employs a standard-width fabric ribbon. Common examples are the DECwriter and the Teletype printers, but there are literally scores of other brands in the same category. My own modification worked so well that I helped to modify more than 200 other printers in hobby, commercial, and university installations.

Remember, the re-inker must *not* be placed between a ribbon spool and its corresponding ribbon-reversing lever. This would alter the length of the path between these two elements, and there would be insufficient ribbon length between the reversing rivet and the spool attachment point. This could cause the ribbon to jam before the reversing lever could be actuated, resulting in damage to the printer.

Filling the Inkwell

It is easy to over-ink a ribbon in your eagerness to get nice, dark print. The best policy is to fill the inkwell just before running a program that will produce a lot of print. This will ensure that the ribbon will move back and forth several times and become evenly saturated. Some experimenting may be necessary, due to varying ribbon lengths.

If your ribbon is old to start with, you may have to fill the inkwell more than once to saturate it, initially. After that, fill it just once whenever the print isn't as dark as you'd like. Be sure to give the ribbon time to make two or three complete passages before deciding to add more ink.

To fill the well, unscrew the cap and fill the reservoir within 1/8 inch (4 mm) of the rim. Then replace the cap. This can be done without taking the inkwell out of the printer. Use only NCR (National Cash Register) type K-575-F ink. This is a non-corrosive, thick, black ink that comes in a tube, and is available at NCR repair and sales offices.

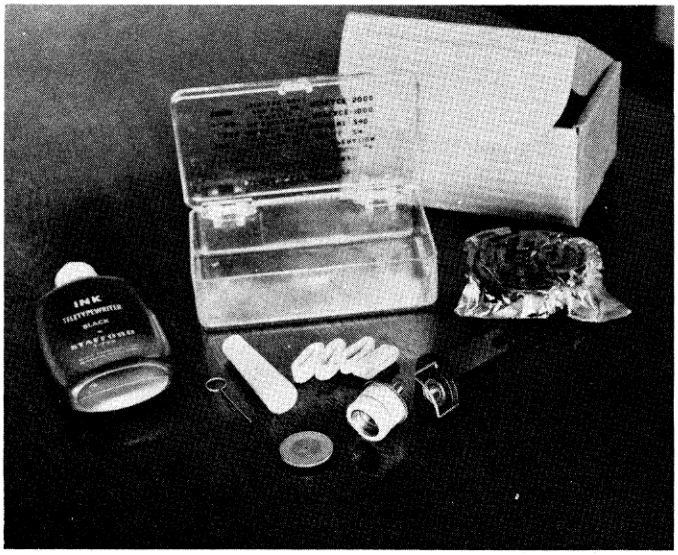


Photo 1. An automatic ribbon re-inker kit before mounting on a microcomputer printer. The main parts are the bracket/bearing assembly and the inkwell assembly. Also, extra felts, nylon ribbon, and special tools for maintenance.

One tube will last for years. This ink has the right consistency to flow properly in the re-inker, and it will not damage the machine's print head.

Where to Buy Re-inkers

The automatic re-inker kits described are available in new, unused condition from surplus dealers and firms which handle Teletype equipment. As in Photo 1, the kit contains the bracket/bearing assembly, inkwell, extra felts, nylon ribbon (with spool), a bottle of ink, a tool for shaping the felts, and a tool for cleaning the feed holes in the inkwell. The first thing you must do is to throw out the bottle of ink. Most of these kits were manufactured more than 10 years ago, and the ink supplied is not satisfactory. Use only the NCR K-575-F ink.

If you can't locate a re-inker kit, I have a few left from the modification projects here and I will sell them on a first-come first-served basis for $18.25, which includes kit, postage and insurance. Add $1.00 for first class mail. Also include a self-addressed, stamped envelope; I will return your money if all kits have been sold.■

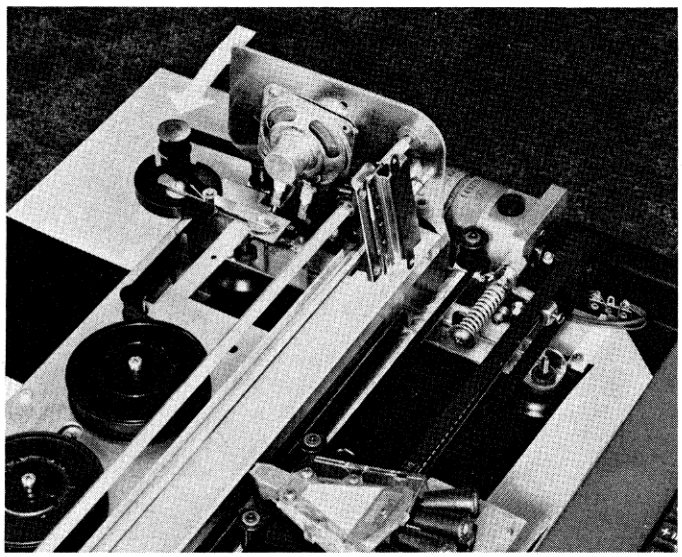


Photo 2. This shows the installation of a surplus re-inker kit in an LA36 DECwriter. Crisp, dark print is produced continuously, 24 hours a day. Just refill the inkwell once every few days.

SCIENTIFIC SUBROUTINE LIBRARY FOR ENGINEERS, SCIENTISTS AND MATHEMATICIANS

American Computer Development, Inc. proudly introduces the most powerful collection of scientific subroutines ever written for microcomputers. Before now these programs were only available for large mainframe computers such as the IBM 370*. This collection of 72 distinct programs are up and running and can be working for you NOW on your TRS-80** Model I. In seconds these programs will perform some of the most difficult and time-consuming problems you face. For example, you can solve Eigenvalue problems, invert matrices, solve differential equations, do multiple linear regressions, and much, much more.

LIBRARY INCLUDES:

POLYLIB — This is a collection of 8 subroutines designed to handle polynomial operations of a very high order, including polynomial addition, subtraction, division, multiplication, evaluation, differentiation, integration, normalization, and extraction of roots, both real and complex.

FUNCLIB — This is a set of 10 subroutines to compute the value of a series expansion in some special polynomial, the value of a special polynomial or special function, such as the gamma function.

MATLIB — This is a collection of 13 very powerful matrix-handling subroutines which can be used individually or can be linked together to form program modules to perform successive matrix operations. These subroutines all use Variable Array Dimensioning.

CALCLIB — This is a collection of 7 subroutines designed to integrate, differentiate, and solve both single and systems of differential equations. The differential equations programs use the Fourth-Order RUNGE-KUTTA method.

STATLIB — This is a set of 26 different subroutines to calculate many statistical properties of various data sets. While most of the programs can be used individually, several can be called in order to perform very sophisticated analyses, such as multiple linear regressions and polynomial regressions.

MISCLIB — This is a collection of 8 subroutines to calculate various results, including Fourier analysis, Fourier transforms, least squares fits, and the solving of nonlinear equations.

PADD	PSUB	PMPY	PDIV	PVAL	PDER	PINT	POLRT	HEP
HEPS	LEP	LEPS	GMMMA	BESJ	BESY	BESK	I0	INUE
GMADD	GMSUB	GMPRD	GMTRA	SADD	SSUB	SMPY	SDIV	MFUN
SIMQ	MINV	EIGEN	MSTR	DGR3	QTFG	QG2	QG10	RK1
RK2	RKGS	TALLY	BOUND	ABSENT	CORRE	ORDER	MULTR	GDATA
AVDAT	AVCAL	MEANQ	AUTO	CROSS	SMO	EXSMO	CHISQ	QTEST
RANK	MOMENT	TTEST	GAUSS	BDTR	CDTR	NDTRI	DLGAM	RAND
NDTR	RTNI	FMFP	SE13	APLL	APFS	FORIF	FORIT	FFT

DOCUMENTATION: Each diskette comes with 103 pages of documentation containing calling conventions, parameters, notes, examples, appendices and index.

MINIMUM SYSTEM REQUIRED: 32K RAM with single disk drive

TO ORDER: Send check or money order in the amount of $99.95 per copy made payable to

AMERICAN COMPUTER DEVELOPMENT, INC. ✓227

1735 Briarcrest Dr., Suite 200

Bryan, Texas 77801

713/775-1516 713/775-1510

Telephone orders accepted. Dealer inquiries invited. VISA and MASTER CHARGE accepted. Send card number and expiration date. Price includes shipping and handling. Immediate delivery.

*IBM 370 is a Trademark of the International Business Machines Corporation.
**TRS-80 is a Trademark of the Tandy Corporation.

✓See List of Advertisers on page 306

A software tool to retrieve the irretrievable.

Direct Statement in File

D.E. Fitchhorn
3504 Piermont Dr. N.E.
Albuquerque, NM 87111

You've tried to load a BASIC program file from disk and the error message DIRECT STATEMENT IN FILE appears on the screen. When you don't have a backup copy, what do you do?

Usually, you have to start over, retyping the program from written copy. Next, you edit for the latest changes and reSAVE it. You face the same problem when you move one or more lines from one place to another in a program.

DIRECT STATEMENT IN FILE doesn't mean that the total file has been lost. It does mean that at least one line in the file doesn't have a line number. Even though a program can't be loaded under BASIC with this error, the whole program file can be listed at DOS level as it existed on disk.

If the file is intact and can be read by DOS, then the file can be salvaged by inserting a properly sequenced line number or obviating the need for a line number. The BASIC editor is of no use since it can't edit a program line that can't be loaded, and will not permit changes to be made to a line number.

Easy Repair

There is an easy way to repair these problems in a program saved as an ASCII file. A program that will read the BASIC program file as if it were a random access data file will also permit you to correct direct statement errors and change a line number.

Program DSKREP/BAS does this, reading BASIC files sector by sector like random access files, and reporting on the contents of each sector, byte by byte. It provides the option of listing the sector data in hex or ASCII form.

When a BASIC program fails to load completely because of a direct statement error, part of the file has been loaded into memory and that portion can be listed uncovering the line number of the last good statement in file. Once that line number has been located, the problem line can be located in the sector data. You will know the number of sectors in the file from the DIR data and the approximate location of the error, and can estimate the number of the sector containing the error. Observing the data printed for that sector helps pinpoint the sector containing the error. Data following the carriage return code at the end of the last good line normally contains the error.

DSKREP/BAS searches the computer sector by sector, for an ASCII string (a line number or another ASCII string clue) that you select. The program then prints the data in that sector.

The edit function accesses each byte in a sector and replaces the contents of that byte with the desired code. If a line number is changed, loading later under BASIC will rearrange the code in memory to place the line in proper position.

How it works

DSKREP/BAS first asks for the name of the file to be repaired. The program asks whether you want to locate the problem area using an ASCII string clue or by the number of the sector, for which the program then asks.

After the sector data has been printed, the program asks if you want to make a change. Y causes the program to continue the edit function, while N reverts the program to the sector number request routine.

The program next asks for the number of the byte to be changed, which should be answered with its decimal number (0 to 255). The program will print, if printable, the character in that byte. The next query asks for the ASCII character to replace the present character. This can be answered with an ASCII character or a decimal number of an ASCII character for characters not acceptable in a string variable (carriage return, etc). This operation can be repeated until all necessary changes are made.

After all changes have been made, answer the byte number query with a number greater than 255 to save the changes and return to the main program. If the sector number query is answered with a 0, the program reverts to the filespec level. Answer END to the query; FILESPEC ends the program run.■

Program Listing

```
240 ' * INITIALIZE
260 '
280 CLEAR 2000:CLS:DEFINT I-N
300 DIM H$(15),DA$(260)
320 FOR I = 0 TO 15:READ H$(I):NEXT I
340 CLS:PRINT @15,"ASCII FILE SECTOR REPAIR UTILITY "
360 '
380 ' * GET FILENAME AND OPEN FILE
400 '
420 LINEINPUT"
FILENAME: ";FS$:IF FS$ = "END" THEN END
     ELSE ON ERROR GOTO 1600  :OPEN"I",1,FS$
440 ON ERROR GOTO 0    :CLOSE:OPEN"R",1,FS$:SN = 0:S$ =
     ""
460 FOR J = 0 TO 255:FIELD 1,(J*1) AS DUMY$,1 AS DA$(J)
     :NEXT J
480 FIELD 1,255 AS DU$,1 AS DD$
500 '
520 ' * DECIDE HOW TO LOCATE SECTOR
540 '
560 SL$="":INPUT"
LOCATE SECTOR BY SEARCH STRING OR SEC
     TOR NUMBER?? (S OR N) ";SL$
580 IF SL$="E" THEN CLOSE:GOTO 340
600 IF SL$<>"S" AND SL$<>"N"GOTO560
620 IF SL$="S"GOTO 820
640 '
660 ' * LOCATE BY SECTOR NUMBER
680 '
700 S$="":INPUT"
SECTOR NUMBER (OR 'ENTER' FOR NEXT SEC
     TOR): ";S$
720 IF S$ = ""THEN SN = SN + 1 ELSE SN = VAL(S$):IF SN
     < 1 THEN CLOSE: GOTO 340
740 GOTO1020
760 '
780 ' * LOCATE BY ASCII STRING
800 '
820 SS$="":INPUT"
STRING TO SEARCH FOR?  ";SS$
840 FOR I  = 1 TO LOF(1):GET 1,I
860 Z = INSTR(DU$,SS$)
880 IF Z <> 0 GOTO 920
900 NEXT I
920 SN = I
940 IF Z = 0 THEN PRINT "STRING NOT FOUND !!":GOTO 820

960 '
980 ' * GET PROPER SECTOR
1000 '
1020 GET1,SN
1040 '
1060 ' * PRINT SECTOR INFORMATION
1080 '
1100 CLS:PRINT@64,"FILE : "FS$;TAB(35)"SECTOR: "SN
1120 L1=-4:J1=-1:J2=-1
1140 FOR I = 0 TO 3: L1 = L1+4
1160 PRINT@255,"":FOR L=0TO3:PRINT(L1+L)*16;TAB(6);:FOR
     K=1TO16:J1 =J1+1
1180 V=ASC(DA$(J1)):MN=INT(V/16):LN=V-MN*16:PRINT H$(MN
     )+H$(LN)+" ";
1200 NEXTK:PRINT
1220 PRINT TAB(7);:FOR K=1TO16:J2=J2+1:IFDA$(J2)>" "AND
     DA$(J2)<"Z"THENPRINTDA$(J2);"  ";:ELSEPRINT".  ";:
1240 NEXTK:PRINT
1260 NEXTL:PRINT @1000,"CONTINUE  ";:INPUTYN$
1280 CLS:IF I > 2 GOTO 1300 ELSE PRINT@64,"FILE :  "FS$
     ;TAB(35)"SECTOR :  "SN
1300 NEXTI:GOTO1380
1320 '
1340 ' * CHANGE DECESSIONS
1360 '
1380 YN$="":INPUT"DO YOU WANT TO MAKE A CHANGE  ?";YN$:
     IFYN$<>"Y"GOTO560
1400 INPUT"# OF THE BYTE YOU WANT TO CHANGE?";X:IFX>255
     THEN1560
1420 X$=DA$(X+1):PRINT X$:INPUT"CHANGE TO CHARACTER?";X
     $
1440 IF LEN(X$)=1 GOTO 1480
1460 X$ = CHR$(VAL(X$))
1480 LSET DA$(X+1)=X$:GOTO 1400
1500 '
1520 ' * CHANGE THE FILE
1540 '
1560 PUT1,SN:GOTO340
1580 DATA "0","1","2","3","4","5","6","7","8","9","A","
     B","C","D","E","F"
1600 PRINT!TAB(10)" - FILE NOT FOUND - ":RESUME 340
```


✓441 **PROSOFT** T.M.

Dept.C / Box 839 / No. Hollywood, Ca. 91603 / 213-764-3131

Word Processing

✱ SUBSCRIPT 5.0 $79.95

With our software, your TRS-80® Model I or III and LINE PRINTER IV or CENTRONICS® 737 can easily produce right-justified, proportional spaced documents with this typeset look.

EPSON® MX-80 owners can underline and use all 12 fonts with this professional quality software.

With SELECTRICS® and most other printers, you can take advantage of our 100+ pages of excellent documentation and 90+ functions, including:

multiple top and bottom titles
line split, join, and duplicate
global search and change
visible control words
very large documents
block move and copy
right-justification
table of contents
form letters
underlining
centering
autosave
index
super scripts and sub scripts (some printers)

Epson MX-80 · Line Printer IV · Selectric

Version 5.0 incorporates all features of our earlier PROP, SUBEDIT, SUBSCRIPT, and MININIT components, and adds several user-requested new features. It is based on IBM's highly-regarded CMS Time-Sharing system, so if you've been looking for "mainframe" quality Word Processing, you've just found it.

✱ DVORAK

Keyboard translator with press-on labels:	$19.95
Typing Tutor (requires a translator):	$19.95
Special: Both DVORAK programs:	$34.95

Software Speedups

✱ FASTER $29.95

Analyses executing BASIC programs, then identifies a simple program change to improve their execution speed. NO hardware changes are involved, works with packages as well as your own code and can reduce run-times by 10-50%. Example: "move selection" in "Othello" dropped from 48 to 32 seconds. This will be one of your most valuable utilities!

✱ QUICK COMPRESS $19.95

Makes many Model I BASIC programs faster and 30-60% smaller by removing blanks and selected remarks at your option. Processes 800 multi-statement lines in 3 seconds, needs only 270 bytes.

✱ XTEND40 $14.95

Quickly upgrades Model I 35-track disks to 40 tracks with your 40-track drives and Operating System.

ORDERING

Models I and III, tape or disk:	FASTER, DVORAK
Models I and III, 32-48K disk:	SUBSCRIPT
Model I:	COMPRESS, XTEND40

Tape versions run on 16-48K Level II. Disk versions run with TRSDOS® 2.3, NEWDOS, NEWDOS/80®, and Model III TRSDOS 1.1 & up.

Please add $3.00 for postage & handling, and 6% tax in Calif. Checks, C.O.D.'s ok.

Spring Special: We pay handling on orders over $25.00.

BONUS: Model I orders over $50.00 will include a diskette "re-labeller" program FREE!

✓See List of Advertisers on page 306

If you've ever bought a piece of cassette based software for your disk system. . . read on.

Hardtimes

Joe Fettig
74-355 Buttonwood
Palm Desert, CA 92260

After owning my TRS-80 for a few months, I find it's essential to have a disk storage unit to really enjoy it. Tape cassette storage and access are just too slow and unreliable, leaving me frustrated and ready to sell my system.

I finally bought a disk drive unit and promised myself that I would never buy anything on tape cassette again. Then I ran across a utility called a variables map (variables cross-index reference).

The variables map is an invaluable tool that gives you a list of all the variables used in a program and their line locations. When dealing with long programs, it's nice to know which variables are already in use. This can eliminate using the same variable for two different functions in the same program.

The utilities package in which this debugging aid is available is The Bottom Shelf's *Basic Toolkit* by Barry Mulligan.

I went through the usual two-hour session of trying to get the tape to load, without success. A few hours later it magically loaded and ran. Then all I had to do was use my monitor to get the start and end location and the entry point into the program. It wasn't easy.

The Toolkit has a machine language program that loads and then automatically takes control of the computer, giving an error message on the monitor. The monitor is then supposed to give you the entry point. It failed! (I did notice a card with the Toolkit saying that you could send an additional $10.00 for a disk version.)

Back to Disk

At that point, I brought my project to a screeching halt and put it on disk. If it loaded into memory, it should load onto disk. Using DEBUG I determined that the program was located above memory location 46500 (decimal) in the 32K version I was using.

Using the TAPEDISK F command, I dumped the program onto disk, starting at B5A4H and ending at BFC0. The program was now on disk and would load into memory, but would not execute and I did not know the entry point of the program in memory.

Back to the original tape copy. I loaded it with the monitor again and found that the program was actually two program segments. The first segment loaded into memory, took control, and then loaded the second, main program.

Using DEBUG, I was able to determine exactly what was happening. The first program loaded, and then changed the keyboard control device location at 4016H and 4017H. This was the key to gaining entry into the program. All that was necessary was to load Toolkit when in DOS READY and then execute BASIC (be sure to protect memory).

In BASIC, execute the following program: 10 POKE &H4016, &HDF : POKE &H4017, &HB7.

This changes the keyboard device control so that it jumps to B7DFH instead of its usual location, and then looks for a shift break key. When the shift break key is pressed, the Toolkit program should execute in its normal manner.

The above will work on a 32K TRS-80. The general procedure is outlined below:

- Execute BASIC: Make sure you protect memory.
- Type CMD"T": This stops the clock.
- Type SYSTEM, and load the Toolkit program from tape. (You can test if Toolkit is working by pressing the shift and break keys.)

The next two steps are for 16K and 48K users:

- Type: Print PEEK(&H4016) <ENTER>
  * Record this value
- Type: Print PEEK(&H4017) <ENTER>
  * Record this value

- Press the reset button: This will put you in DOS READY.
- Type TAPEDISK: <ENTER> This loads the Tapedisk program.

● Use the F command listed under TAPEDISK commands. Refer to the table below for your system configuration:

MEMORY SIZE	START	END
16K	7530H	7FC0H
32K	BFA4H	BFC0H
48K	F618H	FFC0H

Use 402DH for the entry.

● After the program has been put on disk, to execute it do the following:

A With DOS READY, load the CMD file into memory.

B Type LOAD "filename", filename being what you called the program when saving it under TAPEDISK.

C Execute BASIC. Protect memory for the program with the size for your system.

● 32K users, execute the BASIC program listed above. Users of other systems (16K and 48K), see the next step.

● 32K users, go to the next step. All others: The BASIC program above will have to be changed to work with your system. The program changes the keyboard device control by POKEing two memory locations with different values. When a shift break is encountered, the Toolkit program then intercepts them. To do this, take step 4A and change the POKE statement in the BASIC program from POKE &H4016, &HDF to POKE &H4016, XXXX where XXXX = value obtained in step 4. Now change the POKE &H4017, &HB7 to POKE &H4017, YYYY where YYYY = value obtained in step 4B.

● Now execute the BASIC program for 32K users or the modified program from step 10 for 16K and 48K users.

● Press the shift and break keys and the Toolkit menu should show up.

The BASIC TOOLKIT is a worthwhile investment for disk users as well as non-disk users. The variables map is a must for the serious programmer. ■

MANAGEMENT SYSTEMS SOFTWARE, INC.

Dr. Jerome S. Osteryoung, renowned business educator, and author of 5 business texts has written the following programs.

1. PROFORMA CASH-BUDGET PROGRAM

Allows the user to project the cash-balances for up to twelve periods in the future. Amount of loan, if needed, is computed as well as computing funds available for short-term investment. **(Price $125)**

2. LEASE-PURCHASE PROGRAM

Evaluates the lease vs. purchase decision incorporating all the latest tax laws including the investment tax credit and accelerated depreciation. This program gives the user all the information necessary to make this decision. **(Price $50)**

3. BUSINESS PROGRAM PACKAGE

13 Business programs (e.g., capital budgeting, cash-management, ratio analysis, debt management). These programs will be very useful to the business manager. **(Price $200)**

4. PROCUREMENT PROGRAM

Ascertains purchase amount when future price of commodity is varying. A must for all managers who have purchasing responsibilities. This program takes into consideration inventory levels, inventory capacity, and financial carrying cost in determining the optimal amount of an item to purchase when future prices are varying. **(Price $150)**

5. COLLEGE ENROLLMENT PROJECTION PROGRAM

Forecasts the enrollment for colleges using several different statistical techniques. User can specify the number of periods for which a forecast is desired. **(Price $100)**

Extensive Documentation With Each Program.

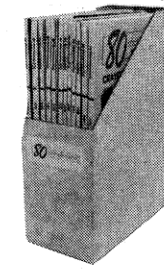
Write or call for a brochure which describes the product in greater detail.

✓87 MANAGEMENT SYSTEMS SOFTWARE INC.

5200 Brittany Drive, #1006 St. Petersburg, Florida 33715
813-864-4347

While they last . . .

the complete year of 1980 80 Microcomputing (in its own shelf box . . . a $2.00 value—Free) for only $25.00.*



Did you miss the 2,256 pages of useful information published for your TRS-80** in *80 Microcomputing* last year? Now is the perfect time to catch up for only $25.00.*

In the first year of *80 Microcomputing* here were 335 articles on your TRS-80—2½ times more than any other computing magazine. Also in 1980 there were new product reviews, news and columns and best of all hundreds of dollars worth of useable programs.

So to unlock the key to your TRS-80 and double its value. . . send in today for the complete year of 1980. *80 Microcomputing* (in its own shelf box) for only $25.00.*

We have a limited number of these complete sets so send in the card today or call our toll free #800-258-5473 and charge it to your VISA, MC or AE card.

**plus shipping and handling ($3.00) **TRS-80 is a Trademark of Tandy*

Yes, I want a year of *80 Microcomputing* for $25.00 plus $3.00 for shipping and handling. Plus I'll receive a shelf box to store them in.

☐ Check enclosed for $_____

Name _____

Address _____

City _____ State_____ Zip_____

Please allow 4 to 6 weeks for delivery

80 Microcomputing • 80 Pine Street • Peterborough, N.H. 03458

Toll free ordering number 800-258-5473

80BI

✓See List of Advertisers on page 306

Got a touch of dance fever?
Then let your 80 show you some night moves.

Dancin! —A Disco Primer

Andrew A. Modla
5 Derby Place
Newtown, PA 18940

Rev up your floppies and let's disco! Here's a routine to use at your next party. Written for the TRS-80, 16K Level II BASIC machine, this disco dance demonstration program is easy to apply.

A number of people have asked my wife and I to teach them disco, ever since we began dance lessons two years ago. I got the computer into the act because it's accurately timed.

Since much disco dance music utilizes electronic bass and percussion instruments to establish a tempo, the beat won't vary much. The computer can follow along quite well.

Three Steps

Three dance steps—Latin Hustle, Disco Hustle and Rope Hustle—are demonstrated with footsteps that move about on the video screen in time to the music. Once synchronized with the music, the footsteps keep time. Do this by entering the rate in beats per minute, while the music is playing, and by then starting the dance on a beat.

I used a stopwatch to determine the number of beats per minute. Calculate the number of beats per minute by dividing the number of beats by the number of seconds timed by a stopwatch. Multiply by 60. Average about six samples to get an accurate number.

I wrote the time-critical part of the program, the footstep display, in machine language called from BASIC. This is the only way to maintain accurate timing of the footsteps. The rest of the program is written in Level II BASIC. The machine language subroutine is POKEd into the high order part of memory.

The program has built-in explanations and instructions, so that a separate instruction sheet is not needed. Some of the built-in features are: selections of either the woman's or man's footsteps for display, footsteps displayed one at a time, stop action on the dance steps, and restart from the first step.

The machine language subroutine for displaying the footsteps is initialized by POKEing at location 32256 the instructions that move the footstep patterns to the display RAM memory. Also initialized are the footstep patterns and control pointers. The subroutine at lines 8800 through 9660 sets up the machine language subroutine.

The text explanations and prompting are shown following initialization. These are done by subroutines starting at lines 6000, 6240, 6370 and 6560.

The dance selected is read from data statements at the end of the program. These statements are instructions about where to place the steps, how much time to delay between steps, and where to go for the next step.

The instructions consist of two parts: the first is a descriptive word indicating a pattern or command, and the second is the screen location for displaying the footstep, or just a number for the next instruction. You may recognize this as an interpretive programming technique. The instructions are converted into numeric code and POKEd into a table area to be accessed by the machine language subroutine. Reading and conversion of the data statements is performed by the subroutine from line 8000 through 8530. The table is stored starting at location 31232.

Patterns are stored starting at location 31744.

The subroutine at line 7000 computes the time delay count used in the machine language subroutine. Three counts are set up: full beat, half beat, and a quarter beat, all stored from locations 32496 to 32501.

On lines 2200, 2230, and 2240, PEEKs are used to read the keyboard RAM area because the BASIC INKEY$ command does not permit checking a key off after returning a key value.

The following variables are used in the program:

D$	Dance name
K$	Input key
I	Index, dummy variable
X	Address pointer, dummy variable
B	Beats per minute
B#	Beats per minute double precision
S	Step rate, one at a time = 1 continuous = 2
G	Address pointer
H	Address pointer
N	Dance name code: 1,2,3
C	Beats per minute conversion to time delay
C#	Beats per minute conversion to time delay
Y	Pattern address pointer
T	Display RAM address pointer
Z	256

M Woman = 1 Man = 2
R Number of END commands to skip while reading DATA statements

Easy Demonstration

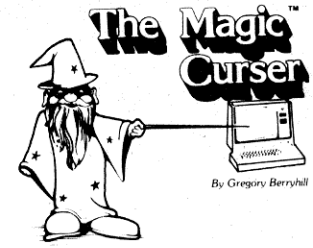
The dance steps of this program were chosen so that the footsteps are oriented upward. This restriction makes it easier to program the dance step demonstrator. However, since many dances use side and turning footstep motions, a more elaborate program is necessary here. All the basic programming principles used can then be applied to more complex dances, both disco and ballroom.

Also note that only the basic steps of a dance are shown. There are many variations of the basic footworks, but here the footstep display routines are not expanded to handle complex motions (by adding extra footprint patterns). Arm and body dance motions are thus left to your imagination. ■

Program Listing

```
10 REM DISCO DANCE STEP DEMONSTRATOR
20 DEFINT A-Z
30 Z=256
40 GOSUB8810:GOSUB6000
50 GOSUB6240
55 GOSUB6370:GOSUB6560:GOTO2070
60 CLS:PRINT@25,D$:POKE32258,0:POKE32259,122
70 I=USR(0)
2000 IFS=2THEN2200
2010 K$=INKEY$:IFK$=""THEN2010
2020 IFK$=CHR$(31)THEN60
2030 IFK$=CHR$(9)THEN55
2040 IFK$=CHR$(91)THEN50
2050 IFK$=" "THEN70
2060 GOSUB6560
2070 K$=INKEY$:IFK$=""THEN2070
2075 IFK$=" "THEN60
2080 IFK$=CHR$(31)THEN60
2090 IFK$=CHR$(9)THEN55
2100 IFK$=CHR$(91)THEN50ELSE2070
2200 K$=INKEY$:X=PEEK(14400):IFX=128THEN2230
2220 IFX=2THEN2240ELSE2020
2230 X=PEEK(14400):IFX=0THEN70ELSE2230
2240 X=PEEK(14400):IFX=0THEN60ELSE2240
6000 CLS:PRINTTAB(15);"DISCO DANCE STEP DEMONSTRATOR"
6020 PRINT:PRINTTAB(15);"COPYRIGHT 1979 ANDREW A. mODLA"
6030 PRINT:PRINT
6040 PRINT"THE DISCO DANCE STEP DEMONSTRATOR SHOWS WITH DANCING FE
     ET"
6050 PRINT"THE BASIC FOOTWORK FOR POPULAR DISCO DANCES. IT CUSTOMI
     ZES"
6060 PRINT"THE DEMONSTRATION FOR EITHER A MAN OR WOMAN'S DANCE STE
     PS."
6070 PRINT"IT ALLOWS YOU TO SET THE SPEED OF THE DANCING FEET FOR
     "
6080 PRINT"SYNCHRONIZATION WITH MUSIC. IT CAN ALSO TAKE YOU THROUG
     H THE"
6090 PRINT"BASIC FOOTWORK STEP BY STEP.
6140 PRINT:PRINT:PRINT@960,"PRESS ANY KEY TO CONTINUE";
6150 K$=INKEY$:IFK$=""THEN6150
6160 CLS:PRINT"THE FOLLOWING DIAGRAMS SYMBOLIZE THE FOOTSTEPS:"
6162 PRINT:PRINTTAB(19);"MAN";TAB(42);"WOMAN"
6165 PRINT
6170 PRINTTAB(14);"LEFT";TAB(23);"RIGHT";TAB(38);"LEFT";TAB(47);"R
     IGHT"
6200 PRINT@704,"A MOVING FOOTSTEP INDICATES A WALKING STEP."
6203 PRINT@748,"A FLASHING FOOTSTEP"
6205 PRINT@768,"IN PLACE INDICATES A WALK IN PLACE."
6206 PRINT@804,"A FOOTSTEP WITHOUT THE HEEL"
6208 PRINT@832,"INDICATES A TAP STEP USING THE BALL OF THE FOOT."
6210 PRINT@960,"PRESS ANY KEY TO CONTINUE";
6215 POKEG,126:POKEH,208:I=USR(0)
6220 POKEH,212:I=USR(0)
6225 POKEH,216:I=USR(0)
6230 POKEH,220:I=USR(0):POKE16526,0:POKE16527,126
6235 K$=INKEY$:IFK$=""THEN6235ELSERETURN
6240 CLS:PRINT"SELECT ONE OF THE FOLLOWING DISCO DANCES:":PRINT
6250 PRINT"1  LATIN HUSTLE":PRINT"2  DISCO HUSTLE":PRINT"3  ROPE H
     USTLE"
6260 PRINT:PRINT"PRESS KEY 1,2, OR 3 TO MAKE YOUR SELECTION"
6270 K$=INKEY$:IFK$=""THEN6270
6280 IFK$="1"THEN6290ELSEIFK$="2"THEN6290ELSEIFK$="3"THEN6290ELSE6
     270
6290 N=VAL(K$)
6291 ONNGOTO6292,6293,6295
6292 D$="LATIN HUSTLE":GOTO6300
6293 D$="DISCO HUSTLE":GOTO6300
6295 D$="ROPE HUSTLE":GOTO6300
```

Program continues



The Magic Cursor allows you to easily create screens (including graphics) on your video. A powerful command then generates the BASIC instructions to recreate the screen.

The Magic Cursor makes sophisticated Data Entry and Display easy. With **the Magic Cursor**, you define the data entry or display fields directly on your screen. The definition commands will generate the BASIC instructions to implement data entry and display.

The Magic Cursor will also:
- create graphical characters simply on the screen
- duplicate characters on the screen easily
- store screens for later use in the same session
- reload screens created in previous sessions
- center blocks of text on the screen
- move blocks of text on the screen
- right justify text within a block on the screen

and more . . . it has 27 powerful commands!!

MAGIC CURSOR (32K Disk) Mod I $99.95

Trace-80™

TRACE-80 lets you observe the inner working of a machine language program. It allows you to run a machine language program in slow motion and watch the screen. You can stop execution at any time and examine the contents. You can execute your program and watch each instruction mnemonic and register contents list to the screen in place of normal screen display.

If you have a printer, **TRACE-80** allows you to execute your program in slow motion and watch the screen while your printer simultaneously prints the machine code being executed, the memory location and the instruction mnemonic along with the current register contents.

TRACE-80 allows you to trace ROM as well as RAM because instructions are emulated in a special execution buffer.

TRACE-80/Mod I (16K Tape or Disk) $29.95
TRACE-80/Mod II $49.95

The Restauranteur's Consultant™

This food and beverage management tool dramatically reduces the human factors in food cost analysis. Those tasks required to effectively operate any restaurant or food service business. Over a half dozen reports give uniform, accurate and up to the minute information for profitability. And handling of daily cost changes requires only minutes per week, instead of hours because the Consultant makes all the necessary conversions from your case prices.

Mod I, 32K, 2 Disk, Printer or Mod II $750.00

CUSTOM COMPUTER CENTER, INC.

For Ordering or Information Write
P.O. Box 58042 Houston, TX 77058
Attn: Jim Martens
or Call (713) 474-2428
ADD $5.00 POSTAGE & HANDLING

✓7

WRITE FOR OUR COMPLETE SOFTWARE CATALOG!!

MTS OFFERS A ***COMPLETE*** *EDUCATIONAL PACKAGE FOR STUDENTS AND TEACHERS OF ENGINEERING MATHEMATICS STATISTICS*

*DEVELOPED BY DR. S. W. TURNER FOR THE TRS-80**

CURVFIT Determines coefficients for all polynomials up to 14th degree through large no. of data points (limited by memory size). Data points may be input in any order. Program tabulates correlation coefficients for selection of best fit.

CURVPLOT Rapidly plots nearly any user defined function. User controls range of X & Y and program labels both axes. Easy to use.

NEW! *POLYSOLV* Solves any polynomial of any degree for all roots, including real and imaginary. Program uses iterative procedures which automatically vary starting point to handle any equation.

Any of the above programs on:
cassette for 16K LVII. . .16.95/ 2 for 29.95
formated disk for 32K, 48K disk . . .19.95/ 2 for 32.95.

BONUS PACKAGE for disk users. All 3 programs provide a powerful tool for data analysis or instruction.

Useful for small businesses, schools, colleges, personal use. All three program on formated disk, only 39.00

INDEX-80 for the serious TRS-80* user — save hours of searching — rapidly searches all 1980 issues of '80 Microcomputing'† for keywords or subjects. 356 articles & reviews with nearly 2000 subjects stored. Includes alphabetical index of keywords/subjects.
3 versions: specify
16K LVII cassette, 32K or 48K disk 19.95

Mail or Phone (904) 897-3741
FL. residents add 4% sales tax
Foreign orders add $2.00

✓451

MTS ENTERPRISES
P.O. Box 596 Niceville, FL 32578
MICROCOMPUTER TECHNOLOGY AND SOFTWARE

†TM Wayne Green Inc. *TM Tandy Corp

PROGRAMMING TOOLS FOR YOUR TRS-80™

INSIDE LEVEL II

The Programmers Guide to the TRS-80 ROMS

INSIDE LEVEL II is a comprehensive reference guide to the Level II ROMs which allows the machine language or Basic programmer to easily utilize the sophisticated routines they contain. Concisely explains set-ups, calling sequences, and variable passage for number conversion, arithmetic operations, and mathematical functions, as well as keyboard, tape, and video routines. Part II presents an entirely new composite program structure which loads under the SYSTEM command and executes in both Basic and machine code with the speed and efficiency of a compiler. In addition, the 18 chapters include a large body of other information useful to the programmer including tape formats, RAM useage, relocation of Basic programs, USR call expansion, creating SYSTEM tapes of your own programs, interfacing of Basic variables directly with machine code, a method of greatly increasing the speed at which data elements are stored on tape, and special precautions for disk systems. INSIDE LEVEL II is a clearly organized reference manual. It is fully typeset and packed with nothing but useful information. It does not contain questions and answers, ROM dumps, or cartoons. **INSIDE LEVEL II.....$15.95**

SINGLE STEP THROUGH RAM OR ROM

STEP80 allows you to step through any Basic or machine language program one instruction at a time, and see the address, hexadecimal value, Zilog mnemonic, register contents, and step count for each instruction. The top 14 lines of the video screen are left unaltered so that the 'target program' may perform its display functions unobstructed. STEP80 will follow program flow right into the ROMs, and is an invaluable aid in learning how the ROM routines function. Commands include step (trace), disassemble, run in step mode at variable step rate, display or alter memory or CPU registers, jump to memory location, execute a CALL, set breakpoints in RAM or ROM, write SYSTEM tapes, and relocate to any page in RAM. The display may also be routed to your line printer through the device control block so custom print drivers are automatically supported. **STEP80.....$16.95**

TELECOMMUNICATIONS PROGRAM

This machine language program allows reliable high speed file transfers between two disk-based computers over modems or direct wire. It is menu driven and extremely simple to use. Functions include real-time terminal mode, save RAM buffer on disk, transmit disk file, receive binary files, examine and modify UART parameters, program 8 custom log-on messages, automatic 16-bit checksum verification of accurate transmission and reception, and many more user conveniences. Supports line printers and lowercase characters. With this program you will no longer need to convert machine language programs to ASCII for transmission, and you will know immediately if the transmission was accurate. **TELCOM.....$29.95**

PROGRAM INDEX FOR DISK BASIC

Assemble an alphabetized index of your entire program library from disk directories. Program names and free space are read automatically (need not be typed in) and may be alphabetized with a fast Shell/Metzner sort by disk or program. The list may also be searched for any disk, program, or extension; disks or programs added or deleted; and the whole list or any part sent to the printer. Finally, the list itself may be stored on disk for future access and update. 'The best thing since sliced bread' (January issue of '80 Microcomputing). Works with TRSDOS, NEWDOS, and NEWDOS/80. One drive and 32K required. **INDEX.....$19.95**

4 SPEED OPTIONS FOR YOUR TRS-80

The SK-2 clock modification allows CPU speeds to be switched between normal, an increase of 50%, or a 50% reduction; selectable at any time without interrupting execution or crashing the program. Instructions are also given for a 100% increase to 3.54 MHz, though the TRS-80 is not reliable at this speed. The SK-2 may be configured by the user to change speed with a toggle switch or on software command. It will automatically return to normal speed any time a disk is active, requires no change to the operating system, and has provisions for adding an LED to indicate when the computer is not at normal speed. It mounts inside the keyboard unit with only 4 necessary connections for the switch option (switch not included), and is easily removed if the computer ever needs service. The SK-2 comes fully assembled with socketed IC's and illustrated instructions. **SK-2.....$24.95**

INSTANT ASSEMBLER

The INSTANT ASSEMBLER is a new, powerful tape-based editor/assembler and debugger for the TRS-80 Model I. It features immediate detection of errors as the source code is entered, assembly to memory as well as to tape, a built-in single-stepping debugger, a compactly coded source format that uses 1/3 as much memory as standard source, the ability to produce relocatable code modules, and the ability to link-load independently written modules. In addition, the INSTANT ASSEMBLER has many operational features including single stroke entry of DEFB and DEFW, continuous editing of succesive lines, alphabetic listing of symbol table, separate commands for listing error lines or the symbol table, block move function, and verification of source tapes.
INSTANT ASSEMBLER includes three separate programs. The assembler itself includes the single-stepper and debugger. In this mode you may have full register displays, decimal or hex entry, forward or backward memory displays, disassembly of object code in memory, memory display in ASCII format, and hex-to-decimal or decimal-to-hex conversion. The single-stepper will step one instruction at a time or at a fast rate to any defined address. During assembly you may quickly switch from assembler to debugger and back again without losing the source code. This makes INSTANT ASSEMBLER an excellent learning tool for machine language programming. Also included on the tape are two versions of the linking loader which allow you to write your programs in smaller modules and link them together for final assembly.
INSTANT ASSEMBLER occupies 8375 bytes of memory. In a 16K machine this will leave you more than 7000 bytes which is enough to write assembly language programs of around 2000 bytes. This makes it ideal for users with only 16K machines. While this version was written specifically for tape systems, we will soon have a disk version as well. The instruction manual may be purchased separately for $5, which will apply towards the purchase of the INSTANT ASSEMBLER. **INTASM.....$29.95**

RAM SPOOLER AND PRINT FORMATTER

This program is a full feature print formatting package featuring user defineable line and page length (with line feeds inserted between words or after punctuation), screen dump, printer pause control, and baud rate selection. In addition, printing is done from a 4K expandable buffer area so that the LPRINT or LLIST command returns control to the user while printing is being done. Ideal for Selectric or other slow printers. Allows printing and processing to run concurrently. Output may be directed to either the parallel port, serial port, or the video screen. **SPOOLER.....$16.95**

MACHINE CODE FAST FOURIER TRANSFORM

This complete package includes 3 versions of the machine language FFTASM routine assembled for 16, 32, and 48K machines, a short sample Basic program to access them, a 10K Basic program which includes sophisticated interactive graphing and data manipulation, and a manual of instructions and examples. The machine language subroutines use variables defined by a supporting Basic program to make data entry and retrieval extremely fast and easy for custom implementation. They perform 20 to 40 times faster than their Basic equivalent (256 points in 12.5 seconds), and require less than 1550 bytes of memory. The FFT is useful in analyzing stock market and comodity trends as well as for scientific information. **FFTASM.....$49.95**

DUPLICATE SYSTEM TAPES WITH CLONE

Make duplicate copies of any tape written for Level II. They may be SYSTEM tapes or data lists. The file name, load address, entry point, and every byte (in ASCII format) are displayed on the video screen. **CLONE.....$16.95**

RAMTEST FOR LEVEL II

This machine language program is a very thorough test for several types of RAM errors. A complete test of each individual bit in a 48K machine takes just 14 seconds. Includes a separate test for power line glitches. **RAMTEST.....$9.95**

EDIT BASIC PROGRAMS WITH ELECTRIC PENCIL

Load Basic programs or any other ASCII data file into the disk version of Electric Pencil for editting. One command from DOS quickly modifies existing files to Pencil format. One disk and 32K required. **PENPATCH.....$9.95**

MUMFORD MICRO SYSTEMS ✓144

ORDERING: Complete satisfaction is guaranteed or a full refund will be made. All programs are shipped on cassette unless $5 is included for a formatted (no system) disk. Include $1 postage and handling. California residents add 6% sales tax. Visa, Mastercharge and COD orders accepted.

Box 400-E Summerland, California 93067 (805) 969-4557

```
6300 CLS:PRINT"THE DISPLAY WILL SHOW FOOTSTEPS FOR EITHER THE MAN
     OR WOMAN."
6310 PRINT"SELECT FOOTWORK FOR:"
6320 PRINT:PRINT"1  WOMAN":PRINT"2  MAN"
6330 PRINT:PRINT"PRESS KEY 1 ØR 2 TO CONTINUE"
6340 K$=INKEY$:IFK$=""THEN6340
6350 IFK$="1"THEN6360ELSEIFK$="2"THEN6360ELSE6340
6360 M=VAL(K$)
6363 PRINT:PRINT:PRINT"LOOKING UP DANCE IN MEMORY.......";:GOSUB80
     00:RETURN
6370 CLS:PRINT"THE DANCE STEPS CAN BE DISPLAYED ONE AT A TIME AT Y
     OUR COMMAND"
6380 PRINT"OR CONTINUOUSLY WITH ANIMATION."
6390 PRINT:PRINT"1  DANCE STEPS CHANGE ONE AT A TIME"
6400 PRINT"2  DANCE STEPS CHANGE CONTINUOUSLY"
6410 PRINT:PRINT"PRESS KEY 1 OR 2 TO CONTINUE"
6420 K$=INKEY$:IFK$=""THEN6420
6430 IFK$="1"THEN6440ELSEIFK$="2"THEN6440ELSE6420
6440 S=VAL(K$)
6445 B=1:POKE32448,S-1
6450 IFS=1THEN6555
6460 CLS:PRINT"THE ANIMATED STEPS CAN BE SYNCHRONIZED WITH MUSIC T
     O HELP YOU"
6470 PRINT"FOLLOW ALONG. YOU SELECT THE RATE THE FOOTPRINTS CHANGE
      ON THE"
6480 PRINT"DISPLAY IN BEATS PER MINUTE. THE RATES RANGE FROM 85 TO
      150"
6485 PRINT"BEATS PER MINUTE."
6490 PRINT:PRINT"TYPICAL RATES FOR SELECTED MUSIC ARE:"
6500 PRINT:PRINT"112  THE HUSTLE (VAN MCCOY)"
6505 PRINT"126  LE FREAK (CHIC)"
6510 PRINT"136  MACHO MAN (VILLAGE PEOPLE)
6515 PRINT"140  SUNSET PEOPLE (DONNA SUMMER)":PRINT
6530 PRINT"HOW MANY BEATS PER MINUTE";
6540 INPUT B
6550 IFB<85THEN6530ELSEIFB>150THEN6530
6553 GOSUB7000
6555 RETURN
6560 CLS:PRINT"THESE KEYS LET YOU CONTROL THE ACTION:"
6570 PRINT:PRINT"CLEAR","START DANCE STEPS FROM BEGINNING"
6580 PRINTCHR$(94),"TIMING CHANGE"
6590 PRINT"SPACE","START/STOP/NEXT STEP"
6600 PRINTCHR$(91),"SELECT A NEW DANCE"
6610 PRINT:PRINT"ANY OTHER KEY WILL GIVE YOU THIS MENU AGAIN."
6620 PRINT:PRINT:PRINT"PRESS ONE OF THE ABOVE KEYS TO CONTINUE":RE
     TURN
7000 B#=B
7010 C#=((106445000./B#)-1941.)/20.
7020 IFC#>32767THENC#=-(65536-C#)
7030 C=C#:IFC>ØTHENPOKE32496,C/Z ELSEPOKE32496,INT(C/Z+256)
7040 POKE32497,C-Z*INT(C/Z)
7050 C#=((53222500./B#)-1941.)/20.
7060 IFC#>32767THENC#=-(65536-C#)
7080 C=C#:IFC>ØTHENPOKE32498,C/Z ELSEPOKE32498,INT(C/Z+Z)
7090 POKE32499,C-Z*INT(C/Z)
7100 C#=((26611250./B#)-1941.)/20.
7110 IF C#>32767 THEN C#=-(65536-C#)
7120 C=C#:IFC>Ø THEN POKE 32500,C/Z ELSE POKE 32500,INT(C/Z+256)
7130 POKE32501,C-Z*INT(C/Z):RETURN
8000 R=2*N+M-3
8010 RESTORE
8020 IF R=ØTHEN8050
8030 READK$,T:IFK$<>"END"THEN8030
8040 R=R-1:GOTO8020
8050 X=31232
8060 READK$,T
8070 IFK$="MLF1"THENY=31744:GOTO8500
8080 IFK$="MRF1"THENY=31762:GOTO8500
8090 IFK$="MLT1"THENY=31780:GOTO8500
8100 IFK$="MRT1"THENY=31798:GOTO8500
8110 IFK$="WLF1"THENY=31816:GOTO8500
8115 IFK$="WRF1"THENY=31834:GOTO8500
8120 IFK$="WLT1"THENY=31852:GOTO8500
8130 IFK$="WRT1"THENY=31870:GOTO8500
8140 IFK$="ERASE1"THENY=31888:GOTO8500
8150 IFK$="DELAY1"THENY=32496:GOTO8525
8151 IFK$="DELAY2"THENY=32498:GOTO8525
8152 IFK$="DELAY4"THENY=32500:GOTO8525
8160 IFK$="SPACE"THENY=31955:GOTO8500
8170 IFK$="ONE"THENY=31906:GOTO8500
8180 IFK$="TWO"THENY=31913:GOTO8500
8190 IFK$="THREE"THENY=31920:GOTO8500
8200 IFK$="FOUR"THENY=31927:GOTO8500
8210 IFK$="FIVE"THENY=31934:GOTO8500
8220 IFK$="SIX"THENY=31941:GOTO8500
8230 IFK$="AND"THENY=31948:GOTO8500
8480 IFK$="END"THENRETURN
```

Program continues

SCHOOLMASTER

Record Keeping Made Easy!

- Analyzes grade assignments
- Keeps a cumulative grade list
- Maintains current averages
- Prints class lists; progress reports

SCHOOLMASTER is designed to replace or supplement most of the functions of the gradebook. In addition, it serves the function of analysis of scores and grades, and automates the process of producing individual progress reports. Requires 32K disk system; is compatible with NEWDOS, NEWDOS/80 and TRSDOS. $24.95 on disk. Manual alone, $1.00.

☐ Please send Schoolmaster to:

Name: _____

Address: _____

City: _____

State, Zip: _____

THE ALTERNATE SOURCE

1806 Ada Street
Lansing, MI 48910
Ph. (517) 487-3358 or
(517) 485-0344

✓138

Add $2.00 for crush-proof box and postage; $1.50 for COD, 4% for Master Charge or Visa. PO's welcome.

COTTAGE SOFTWARE

PACKER: Automatically edits all or part of your Basic program to ease editing, run faster, or save memory. Has 5 sections: UNPACK—unpacks multiple statement lines into single statements maintaining program logic, inserts spaces and renumbers lines for easier editing. SHORT—shortens your program by editing out all REM statements, unnecessary words and spaces. PACK—executes UNPACK & SHORT then packs lines into multiple statement lines; maintains program logic. RENUM—renumbers program lines including all branches. You specify increment. MOVE—moves any line or block of lines to any new location in the program and renumbers lines. Written in machine language. Supplied on tape in 3 versions for 16K, 32K & 48K.
For TRS-80™ Level II or Disk Basic.....**$29.95**

FAST SORT ROUTINES: for use with Radio Shack's Accounts Receivable, Inventory Control I, & Disk Mailing List Systems for Model I Level II. Sorts in SECONDS! You'll be amazed at the time they can save. Supplied on data diskette with complete instructions.
FAST SORT for Accounts Receivable.....**$19.95**
FAST SORT for Inventory Control I.....**$19.95**
FAST SORT for Disk Mailing List (specify data diskette or tape for one drive system).....**$14.95**
ALL THREE ROUTINES.....**$44.95**

SYSTEM TAPE DUPLICATOR: Copy your system format tapes. Includes verify routine.
For any TRS-80™ Level II.....**$14.95**

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes manual and 50 peel-and-stick labels on tractor feed paper.
For TRS-80™ Level II & printer.....**$15.95**

4116 RAM CHIPS—Tested!! Guaranteed for 1 year to the original purchaser.....16K for **$49.95**

MANY MORE items available. Call or write for catalog. VISA & MASTERCHARGE accepted. Dealer inquiries invited. Kansas residents add 3% sales tax.
Foreign orders in US currency only.
On line catalog on Wichita FORUM-80: 316-682-2113
Or call our 24 hour phone: 316-683-4811 or write:

COTTAGE SOFTWARE
614 N. Harding ✓233
Wichita, KS 67208

"TRS-80 is a registered trademark of TANDY CORP."

✓See List of Advertisers on page 306

SSI ENGINEERING SOFTWARE LIBRARY

STRUMAP- The program that sets the standard in structural engineering software for the Model I, now available to Model II owners.
Model I, 64K, 1-disk----------D $49.95
Model II, 64K----------D $79.95

SECTION PROPERTIES- Another popular engineering program, now available for the Model II.
Model I, 16K, L-II----------T $14.95 D $17.95
Model II----------D $29.95
Pocket Computer----------T $9.95

MATH PAK- Let the POCKET COMPUTER help you learn engineering math programs, high school thru grad school and P.E. Taken from Schaum Outline Series.
Lines and Points----------T $14.95
General Equations Pak--------T $14.95
Also for Model I, L-II-------T $19.95/ea.

MX-80 PRINTER- Bi-directional, upper & lower case, & disposable print head. A high quality printer at a very reasonable price. ---------- $599.00
CABLE---------- $35.00

MEMOREX DISKETTES 5 1/4" Double Density------ $29.95
8" Double Density------ $39.95

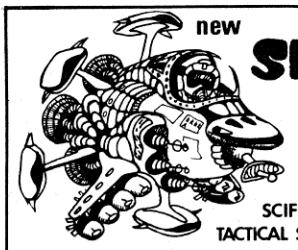
403

SUPERIOR SOFTWARE INC.
P.O. BOX 11676
KANSAS CITY, MO 64138

VISA master charge

MISSOURI RESIDENTS PLEASE ADD 4½% STATE SALES TAX

Write SSI for information about marketing your programs.



new SPACE ACE 21

SCIFI GAME OF TACTICAL SPACE COMBAT

Design your own space fighter. You choose the weapons, equipment, engines, and more. Then engage in a one on one sudden death fly-off. Human opponent or 10 different computer opponents. Fight in 2 or 3 dimensions. Action Sounds and Graphics. The most imaginative scifi game we offer. $19.95
(written by former USAF phantom pilot)

More Super Games with Action Sounds and Graphics:

!!! ANTS !!! Amazing battle between ant colonies. Easy to play. Challenging to master! $14.95
PARSECTOR V The ultimate space war. Unique split video. each player has a private display. $19.95
PARSECTOR 8 Tournament version of Parsector V. Larger galaxy to conquer. $20.95
HIGH SPEED LIFE The fastest, most advanced life game. Up to 2000 gen/min possible. $14.95
NAME THAT STATE QUIZ Educational fun. Draws State and asks questions. $14.95

TRS 80 Level II 16k, Model I or III required. 231
For cassette and instructions send CHECK or MONEY ORDER.

Synergistic Solar Inc. PO Box 560595 Miami FL 33156
Please write for more info. Dealer inquiries invited.

MAXELL® OR Dysan CORPORATION

Some computorists pay less - but may not receive Shuggart™ or IBM® approved disks.

8" SINGLE SIDE DOUBLE DENSITY.....Box of 10 for $60
8" DOUBLE SIDE DOUBLE DENSITY.....Box of 10 for $70
5¼" MINI.....Box of 10 for $50
DYSAN® DISKS
5¼" MINI.....Box of 5 for $25
(Specify - 8" Soft or Hard Sector/5" Soft or Hard Sector)

VISA

C.O.D.- $1.00 Additional

121

Custom Electronics Inc.
238 EXCHANGE STREET
CHICOPEE, MA. 01013
413·592·4761
established 1960 · closed mondays

APPLE TRS-80 IBM WANG ALTAIR DATA GENERAL MATTEL CREMENCO
ATARI TI/99·4 PET

```
8490 PRINT"ERROR IN COMMANDS 8490":END
8500 POKEX,Y/Z:X=X+1:POKEX,Y-Z*INT(Y/Z):X=X+1
8505 T=T+15360
8510 POKEX,T/Z:X=X+1:POKEX,T-Z*INT(T/Z):X=X+1:GOTO8060
8525 T=4*T+31232
8530 POKEX,Y/Z:X=X+1:POKEX,Y-Z*INT(Y/Z):X=X+1:GOTO8510
8800 REM SET UP MACHINE LANGUAGE SUBROUTINE
8810 X=32256
8820 POKEX,221:POKEX+1,33:POKEX+2,0:POKEX+3,122:POKEX+4,205:POKEX+
     5,48
8825 POKEX+6,126:X=X+7
8830 POKEX,205:POKEX+1,48:POKEX+2,126:POKEX+3,205:POKEX+4,48:POKEX
     +5,126:X=X+6
8840 POKEX,58:POKEX+1,192:POKEX+2,126:POKEX+3,254:POKEX+4,0
8845 POKEX+5,202:POKEX+6,156:POKEX+7,126:X=X+8
8850 POKEX,58:POKEX+1,255:POKEX+2,56:POKEX+3,254:POKEX+4,0
8855 POKEX+5,194:POKEX+6,156:POKEX+7,126:X=X+8
8860 POKEX,205:POKEX+1,112:POKEX+2,126:POKEX+3,58:POKEX+4,255
8863 POKEX+5,56:POKEX+6,254:POKEX+7,0:POKEX+8,194:POKEX+9,43
8866 POKEX+10,126:POKEX+11,195:POKEX+12,4:POKEX+13,126:POKEX+14,20
     1
8870 X=32300:POKEX,221:POKEX+1,33:X=32304
8880 POKEX,221:POKEX+1,70:POKEX+2,0:POKEX+3,221:POKEX+4,35
8885 POKEX+5,221:POKEX+6,78:POKEX+7,0:X=X+8
8890 POKEX,221:POKEX+1,35:POKEX+2,221:POKEX+3,102:POKEX+4,0
8895 POKEX+5,221:POKEX+6,35:POKEX+7,221:POKEX+8,110:POKEX+9,0:X=X+
     10
8900 POKEX,221:POKEX+1,35:POKEX+2,10:POKEX+3,87:POKEX+4,50:POKEX+5
     ,193
8905 POKEX+6,126:POKEX+7,3:POKEX+8,10:POKEX+9,95:POKEX+10,3:X=X+11
8910 POKEX,10:POKEX+1,119:POKEX+2,3:POKEX+3,35:POKEX+4,21
8915 POKEX+5,194:POKEX+6,77:POKEX+7,126:X=X+8
8920 POKEX,58:POKEX+1,193:POKEX+2,126:POKEX+3,87:POKEX+4,62:POKEX+
     5,60:POKEX+6,133:POKEX+7,111:POKEX+8,62:POKEX+9,0:POKEX+10,14
     0:POKEX+11,103:POKEX+12,29:POKEX+13,194:POKEX+14,77:POKEX+15,
     126:POKEX+16,201
8922 POKEX+6,133:POKEX+7,111:POKEX+8,62:POKEX+9,0:POKEX+10,140
8925 POKEX+11,103:POKEX+12,29:POKEX+13,194:POKEX+14,77:POKEX+15,12
     6
8930 POKEX+16,201:X=32368
8940 POKEX,221:POKEX+1,102:POKEX+2,0:POKEX+3,221:POKEX+4,35
8945 POKEX+5,221:POKEX+6,110:POKEX+7,0:POKEX+8,221:POKEX+9,35:X=X+
     10
8950 POKEX,70:POKEX+1,35:POKEX+2,78:POKEX+3,62:POKEX+4,0:POKEX+5,1
     1
8955 POKEX+6,184:POKEX+7,194:POKEX+8,127:POKEX+9,126:X=X+10
8960 POKEX,11:POKEX+1,185:POKEX+2,194:POKEX+3,132:POKEX+4,126:POKE
     X+5,195:POKEX+6,160:POKEX+7,126
8970 POKEX+5,195:POKEX+6,160:POKEX+7,126:X=32412
8975 POKEX,221:POKEX+1,35:POKEX+2,221:POKEX+3,35:X=X+4
8980 POKEX,221:POKEX+1,102:POKEX+2,0:POKEX+3,124:POKEX+4,50
8982 POKEX+5,3:POKEX+6,126:POKEX+7,221:POKEX+8,35:X=X+9
8985 POKEX,221:POKEX+1,110:POKEX+2,0:POKEX+3,125:POKEX+4,50:POKEX+
     5,2
8987 POKEX+6,126:X=X+7
8990 POKEX,229:POKEX+1,221:POKEX+2,225:POKEX+3,201
9000 REM SET UP POINTERS
9010 H=32302:G=32303:POKE16526,44:POKE16527,126
9020 X=32464
9030 POKEX,124:POKEX+1,0:POKEX+2,61:POKEX+3,142:POKEX+4,124
9035 POKEX+5,18:POKEX+6,61:POKEX+7,152:X=X+8
9040 POKEX,124:POKEX+1,72:POKEX+2,61:POKEX+3,166:POKEX+4,124:POKEX
     +5,90
9045 POKEX+6,61:POKEX+7,176
9050 REM SET UP FOOTSTEP PATTERNS
9060 X=31744:POKEX,4:POKEX+1,4:X=X+2:
9070 POKEX,184:POKEX+1,191:POKEX+2,191:POKEX+3,189
9080 POKEX+4,143:POKEX+5,143:POKEX+6,143:POKEX+7,135
9090 POKEX+8,176:POKEX+9,176:POKEX+10,176:POKEX+11,144
9100 POKEX+12,139:POKEX+13,143:POKEX+14,143:POKEX+15,129
9110 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9120 POKEX,190:POKEX+1,191:POKEX+2,191:POKEX+3,180
9130 POKEX+4,139:POKEX+5,143:POKEX+6,143:POKEX+7,143
9140 POKEX+8,160:POKEX+9,176:POKEX+10,176:POKEX+11,176
9150 POKEX+12,130:POKEX+13,143:POKEX+14,143:POKEX+15,135
9160 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9170 POKEX,184:POKEX+1,191:POKEX+2,191:POKEX+3,189
9180 POKEX+4,143:POKEX+5,143:POKEX+6,143:POKEX+7,135
9190 POKEX+8,32:POKEX+9,32:POKEX+10,32:POKEX+11,32
9200 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9210 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9220 POKEX,190:POKEX+1,191:POKEX+2,191:POKEX+3,180
9230 POKEX+4,139:POKEX+5,143:POKEX+6,143:POKEX+7,143
9240 POKEX+8,32:POKEX+9,32:POKEX+10,32:POKEX+11,32
9250 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9260 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9270 POKEX,160:POKEX+1,190:POKEX+2,189:POKEX+3,144
```

Program continues

```
9280 POKEX+4,139:POKEX+5,143:POKEX+6,143:POKEX+7,129
9290 POKEX+8,32:POKEX+9,176:POKEX+10,32:POKEX+11,32
9300 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9310 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9320 POKEX,184:POKEX+1,191:POKEX+2,180:POKEX+3,32
9330 POKEX+4,139:POKEX+5,143:POKEX+6,143:POKEX+7,129
9340 POKEX+8,32:POKEX+9,160:POKEX+10,144:POKEX+11,32
9350 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9360 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9370 POKEX,160:POKEX+1,190:POKEX+2,189:POKEX+3,144
9380 POKEX+4,139:POKEX+5,143:POKEX+6,143:POKEX+7,129
9390 POKEX+8,32:POKEX+9,32:POKEX+10,32:POKEX+11,32
9400 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9410 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9420 POKEX,184:POKEX+1,191:POKEX+2,180:POKEX+3,32
9430 POKEX+4,139:POKEX+5,143:POKEX+6,143:POKEX+7,129
9440 POKEX+8,32:POKEX+9,32:POKEX+10,32:POKEX+11,32
9450 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9460 X=X+16:POKEX,4:POKEX+1,4:X=X+2
9470 POKEX,32:POKEX+1,32:POKEX+2,32:POKEX+3,32
9480 POKEX+4,32:POKEX+5,32:POKEX+6,32:POKEX+7,32
9490 POKEX+8,32:POKEX+9,32:POKEX+10,32:POKEX+11,32
9500 POKEX+12,32:POKEX+13,32:POKEX+14,32:POKEX+15,32
9510 X=X+16:POKEX,5:POKEX+1,1:X=X+2
9520 POKEX,32:POKEX+1,79:POKEX+2,78:POKEX+3,69:POKEX+4,32:X=X+5
9525 POKEX,5:POKEX+1,1:X=X+2
9530 POKEX,32:POKEX+1,84:POKEX+2,87:POKEX+3,79:POKEX+4,32:X=X+5
9540 POKEX,5:POKEX+1,1:X=X+2
9550 POKEX,84:POKEX+1,72:POKEX+2,82:POKEX+3,69:POKEX+4,69:X=X+5
9560 POKEX,5:POKEX+1,1:X=X+2
9570 POKEX,32:POKEX+1,70:POKEX+2,79:POKEX+3,85:POKEX+4,82:X=X+5
9580 POKEX,5:POKEX+1,1:X=X+2
9590 POKEX,32:POKEX+1,70:POKEX+2,73:POKEX+3,86:POKEX+4,69:X=X+5
9600 POKEX,5:POKEX+1,1:X=X+2
9610 POKEX,32:POKEX+1,83:POKEX+2,73:POKEX+3,88:POKEX+4,32:X=X+5
9620 POKEX,5:POKEX+1,1:X=X+2
9630 POKEX,32:POKEX+1,65:POKEX+2,78:POKEX+3,68:POKEX+4,32:X=X+5
9640 POKEX,5:POKEX+1,1:X=X+2
9650 POKEX,32:POKEX+1,32:POKEX+2,32:POKEX+3,32:POKEX+4,32:X=X+5
9660 RETURN
11000 REM LATIN HUSTLE WOMAN
11010 DATA WLF1,218
11020 DATA WRF1,226
11030 DATA SPACE,989
11040 DATA DELAY1,4
11050 DATA ERASE1,226
11060 DATA WRT1,232
11070 DATA ONE,989
11080 DATA DELAY1,8
11090 DATA ERASE1,232
11100 DATA WRF1,226
11110 DATA TWO,989
11120 DATA DELAY1,12
11130 DATA ERASE1,218
11140 DATA WLF1,602
11150 DATA THREE,989
11160 DATA DELAY2,16
11170 DATA ERASE1,226
11180 DATA WRF1,610
11190 DATA AND,989
11200 DATA DELAY2,20
11210 DATA ERASE1,602
11220 DATA WLF1,410
11230 DATA FOUR,989
11240 DATA DELAY1,24
11250 DATA ERASE1,610
11260 DATA WRF1,226
11270 DATA FIVE,989
11280 DATA DELAY1,28
11290 DATA ERASE1,410
11300 DATA WLF1,218
11310 DATA SIX,989
11320 DATA DELAY1,4
11330 DATA END,0
12000 REM LATIN HUSTLE MAN
12010 DATA MLF1,218
12020 DATA MRF1,226
12030 DATA SPACE,989
12040 DATA DELAY1,4
12050 DATA ERASE1,218
12060 DATA MLT1,212
12070 DATA ONE,989
12080 DATA DELAY1,8
12090 DATA ERASE1,212
12100 DATA MLF1,218
12110 DATA TWO,989
12120 DATA DELAY1,12
```

Program continues

TRS-80 Model I and Model II Programs

MULTIPLE REGRESSION 2.1—A disk based package of chained programs that permits model estimation using thousands of observations, user specified transformations, X-Y plots, formatted for screen or printer $45.00

Linear Programming..... $39.95
0-1 Programming..... $39.95
Transportation Algorithm..... $39.95
Heuristic Line Balancing..... $39.95
Stat. Pack—medium, mode, mean (avg., harmonic, geometric), variance, histograms, Tests (T,X²,F,) one variable regression, one and two-way ANOVA. $24.95
Differential equations—6 methods..... $39.95
Queuing Statistics..... $18.95
LOWERCASE MOD—Includes excellent documentation + all parts (nothing else to buy), compatible with Electric Pencil..... $14.95

Available in Disk add $5
S.C. residents add 4% sales tax
Overseas orders add $5 for shipping

✓269
Quant Systems
p.o. box 628
charleston sc
29402

MEMOREX
DISKETTES & CARTRIDGES
for your computer or word processor

BUY THE BEST FOR LESS. Lowest prices. **WE WILL NOT BE UNDERSOLD!!** Buy any quantity. Call free (800) 235-4137 for prices and information.

✓370
PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. (In Cal. call
(805) 543-1037.)

UNBALANCED?

If it's because you can't find a decent system to handle checking accounts on a TRS-80* Model 1, then you may need MICROCHECK-80. With MICROCHECK-80 you enter checks and deposits on the keyboard, store them on disk, automatically reconcile bank statements, and maintain a complete cleared check file. Each check is given an expense category, permitting retrieval by category, month, any combination of the two, or in detail. A summary of expense categories is also included.

MICROCHECK-80 is easy to use, well documented, and FAST! Machine language programs, and a system designed to eliminate sorting, provide incredible efficiencies over conventional techniques. The package is perfect for personal or small business use, and requires 32K plus one disk. 48K and a printer unlock the system's full potential.

Why not throw away your checkbooks, and let the computer do the arithmetic and recordkeeping for you? $39.95 postage paid. Send check or write for detailed information. (Specify memory size.)

SUMA MICROWARE ✓267
1110 WEST 41st STREET
LA GRANGE, ILLINOIS 60525

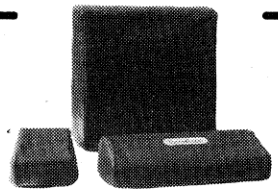
*A Trademark of Tandy Corporation.

✓100

CompuCover®

COVER YOUR INVESTMENT

- Cloth Backed Naugahyde Vinyl
- Improved Reliability
- Longer Life
- Waterproof & Dustproof
- Two Decorator Colors Saddle Tan • Black



TRS-80 MODEL I	
Keyboard	$ 7.95
Cassette	4.95
Video Display	9.95*
Package Offer	18.95*
*NOTE-Add $3.00 for Expansion Interface	
TRS-80 5¼" Disk	$ 4.95
Two Disk Cover (side by side)	7.95
TRS-80 MODEL II	
Entire Unit	$22.95
Keyboard Only	7.95
Three Disk Unit (8" Drives)	18.95
TRS-80 MODEL III	$14.95
TRS-80 COLOR COMPUTER	9.95
Line Printer I	$16.95
Line Printer II	9.95
Line Printer III	15.95
Line Printer IV	9.95
Line Printer VI	14.95
Daisy Wheel Printer II	16.95
Quick Printer I	9.95
Quick Printer II	5.95

Over 200 covers, write for complete list.

master charge — VISA

Send check or money order to

CompuCover
P.O. Box 324 (Dept A)
Mary Esther, FL 32569
Phone (904) 243-5793

Include $1.50 for postage and handling. Overseas orders include $4.00 postage.

DEALER INQUIRES INVITED

CHEAP CHIPS . . . ARE NO BARGAIN

BUYING ADD-ON MEMORY? GET THE BEST!!!

WE'LL BEAT ANY DEAL FOR COMPARABLE CHIPS

TOP QUALITY CHIPS AT UNBEATABLE PRICES

Memory failures cost you time and money. Japanese 16k RAM chips have a one-to-ten in-service failure ratio to U.S. chips--from a study by R. Anderson, Computer Div., Hewlett-Packard, reported in ***The Economist***, 4-26-80.

We offer 4116 chips by Fujitsu, NEC, Hitachi, Toshiba and Mitsubishi . . . for most popular computers and expansion memory boards, including:

***Apple *All TRS-80's *New Pet *Heath H-89**
***Superbrain *Expandoram *Many Others**

4116 DYNAMIC RAMS — **THE BEST**
200nsec Plastic $27.70, **Ceramic $37.95**
150nsec Plastic $31.95, **Ceramic $41.95**

STATIC RAMS
2114 450nsec $3.30, 300nsec $3.90; 2101 $2.90.

EPROMS (450 nsec std; ask for hi-speed if required) 2708 $4.80; 2716 5V+12V $9.40; 2716 5V $9.70; 2732 $18.90.

We'll beat any legitimate price for comparable chips. Hi-volume users, dealers, or clubs, ask for quantity discounts. SHIPPING: to $25, $2; to $50, $1; over $50, **FREE**. COD: +$1.40.
DISCOUNTS ON TOTAL: over $100, 5%; over $200, 10%.

MINIS & MICROS INC. • 29486 Trailway
✓98 **Agoura, CA. 91301 • (213) 342-4535**
CA. residents add 6% sales tax

2 YEAR WARRANTY ★ CALL US ANYTIME

EDUCATIONAL SOFTWARE

For TRS-80* Color Computer, PET, Apple II.

ELEMENTARY	**MATH**
SCIENCE	**BIOLOGY**
GEOGRAPHY	**HISTORY**
ECONOMICS	**ACCOUNTING**
FOREIGN LANG.	**BUSINESS ED.**
GRAMMAR	**FARM RECORDS**

COIN INVENTORY

Write for FREE Catalogue:

MICRO LEARNINGWARE ✓89
BOX 2134, N. MANKATO MN 56001
507-625-2205

VISA & MASTER CHARGE ACCEPTED

We pay 15% royalty for Educational Programs listed with us.

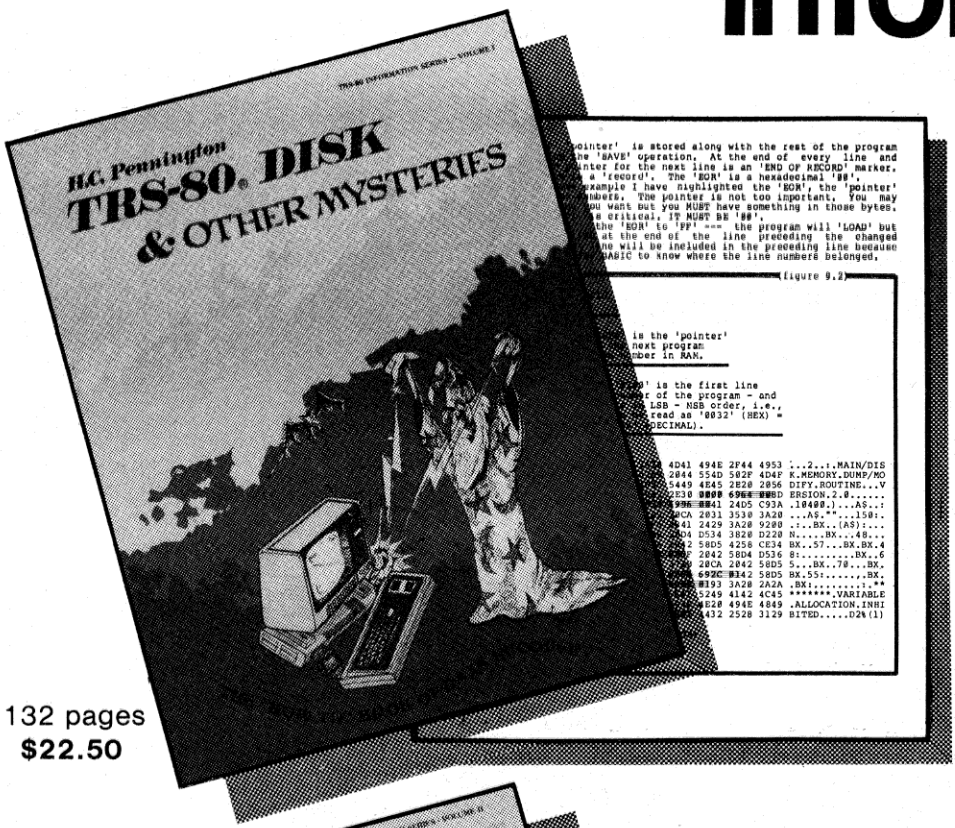
Apple is a trademark of Apple Computer Co.
TRS-80 is a registered trademark of TANDY CORP.
Pet is a trademark of Commodore Bus. Machines.


```
12130 DATA ERASE1,226
12140 DATA MRF1,610
12150 DATA THREE,989
12160 DATA DELAY2,16
12170 DATA ERASE1,218
12180 DATA MLF1,602
12190 DATA AND,989
12200 DATA DELAY2,20
12210 DATA ERASE1,610
12220 DATA MRF1,418
12230 DATA FOUR,989
12240 DATA DELAY1,24
12250 DATA ERASE1,602
12260 DATA MLF1,218
12270 DATA FIVE,989
12280 DATA DELAY1,28
12290 DATA ERASE1,418
12300 DATA MRF1,226
12310 DATA SIX,989
12320 DATA DELAY1,4
12330 DATA END,0
13000 REM DISCO HUSTLE WOMAN
13010 DATA WLF1,218
13020 DATA WRF1,226
13030 DATA SPACE,989
13040 DATA DELAY1,4
13050 DATA ERASE1,226
13060 DATA WRF1,610
13070 DATA ONE,989
13080 DATA DELAY1,8
13090 DATA ERASE1,218
13100 DATA ERASE1,218
13110 DATA TWO,989
13120 DATA DELAY2,12
13130 DATA ERASE1,218
13140 DATA WLF1,218
13150 DATA TWO,989
13160 DATA DELAY2,16
13170 DATA ERASE1,610
13180 DATA WRF1,226
13190 DATA THREE,989
13200 DATA DELAY1,20
13210 DATA ERASE1,218
13220 DATA WLF1,602
13230 DATA FOUR,989
13240 DATA DELAY1,24
13250 DATA ERASE1,226
13260 DATA ERASE1,226
13270 DATA FIVE,989
13280 DATA DELAY2,28
13290 DATA ERASE1,226
13300 DATA WRF1,226
13310 DATA FIVE,989
13320 DATA DELAY2,32
13330 DATA ERASE1,602
13335 DATA WLF1,218
13340 DATA SIX,989
13350 DATA DELAY1,4
13360 DATA END,0
14000 REM DISCO HUSTLE MAN
14010 DATA MLF1,218
14020 DATA MRF1,226
14030 DATA SPACE,989
14040 DATA DELAY1,4
14050 DATA ERASE1,218
14060 DATA MLF1,602
14070 DATA ONE,989
14080 DATA DELAY1,8
14090 DATA ERASE1,226
14100 DATA ERASE1,226
14110 DATA TWO,989
14120 DATA DELAY2,12
14130 DATA ERASE1,226
14140 DATA MRF1,226
14150 DATA TWO,989
14160 DATA DELAY2,16
14170 DATA ERASE1,602
14180 DATA MLF1,218
14190 DATA THREE,989
14200 DATA DELAY1,20
14210 DATA ERASE1,226
14220 DATA MRF1,610
14230 DATA FOUR,989
14240 DATA DELAY1,24
14250 DATA ERASE1,218
14260 DATA ERASE1,218
14270 DATA FIVE,989
14280 DATA DELAY2,28
14290 DATA ERASE1,218
14300 DATA MLF1,218
14310 DATA FIVE,989
14320 DATA DELAY2,32
14330 DATA ERASE1,610
14340 DATA MRF1,226
14350 DATA SIX,989
14360 DATA DELAY1,4
14370 DATA END,0
17000 REM ROPE HUSTLE WOMAN
17010 DATA WLF1,602
17020 DATA WRF1,610
17030 DATA SPACE,989
17040 DATA DELAY1,4
17050 DATA ERASE1,610
17060 DATA WRF1,418
17070 DATA ONE,989
17080 DATA DELAY1,8
17090 DATA ERASE1,602
17100 DATA WLF1,410
17110 DATA AND,989
17120 DATA DELAY1,12
17130 DATA ERASE1,418
17140 DATA WRF1,226
17150 DATA TWO,989
17160 DATA DELAY1,16
17170 DATA ERASE1,410
17180 DATA WLF1,218
17190 DATA AND,989
17200 DATA DELAY1,20
17210 DATA ERASE1,226
17220 DATA WRF1,418
17230 DATA THREE,989
17240 DATA DELAY1,24
17250 DATA ERASE1,218
17260 DATA WLF1,410
17270 DATA AND,989
17280 DATA DELAY1,28
17290 DATA ERASE1,418
17300 DATA WRF1,610
17310 DATA FOUR,989
17320 DATA DELAY1,32
17330 DATA ERASE1,410
17340 DATA WLF1,602
17350 DATA AND,989
17360 DATA DELAY1,4
17370 DATA END,0
18000 REM ROPE HUSTLE MAN
18010 DATA MLF1,602
18020 DATA MRF1,610
18030 DATA SPACE,989
18040 DATA DELAY1,4
18050 DATA ERASE1,602
18060 DATA MLF1,410
18070 DATA ONE,989
18080 DATA DELAY1,8
18090 DATA ERASE1,610
18100 DATA MRF1,418
18110 DATA AND,989
18120 DATA DELAY1,12
18130 DATA ERASE1,410
18140 DATA MLF1,218
18150 DATA TWO,989
18160 DATA DELAY1,16
18170 DATA ERASE1,418
18180 DATA MRF1,226
18190 DATA AND,989
18200 DATA DELAY1,20
18210 DATA ERASE1,218
18220 DATA MLF1,410
18230 DATA THREE,989
18240 DATA DELAY1,24
18250 DATA ERASE1,226
18260 DATA MRF1,418
18270 DATA AND,989
18280 DATA DELAY1,28
18290 DATA ERASE1,410
18300 DATA MLF1,602
18310 DATA FOUR,989
18320 DATA DELAY1,32
18330 DATA ERASE1,418
18340 DATA MRF1,610
18350 DATA AND,989
18360 DATA DELAY1,4
18370 DATA END,0
```

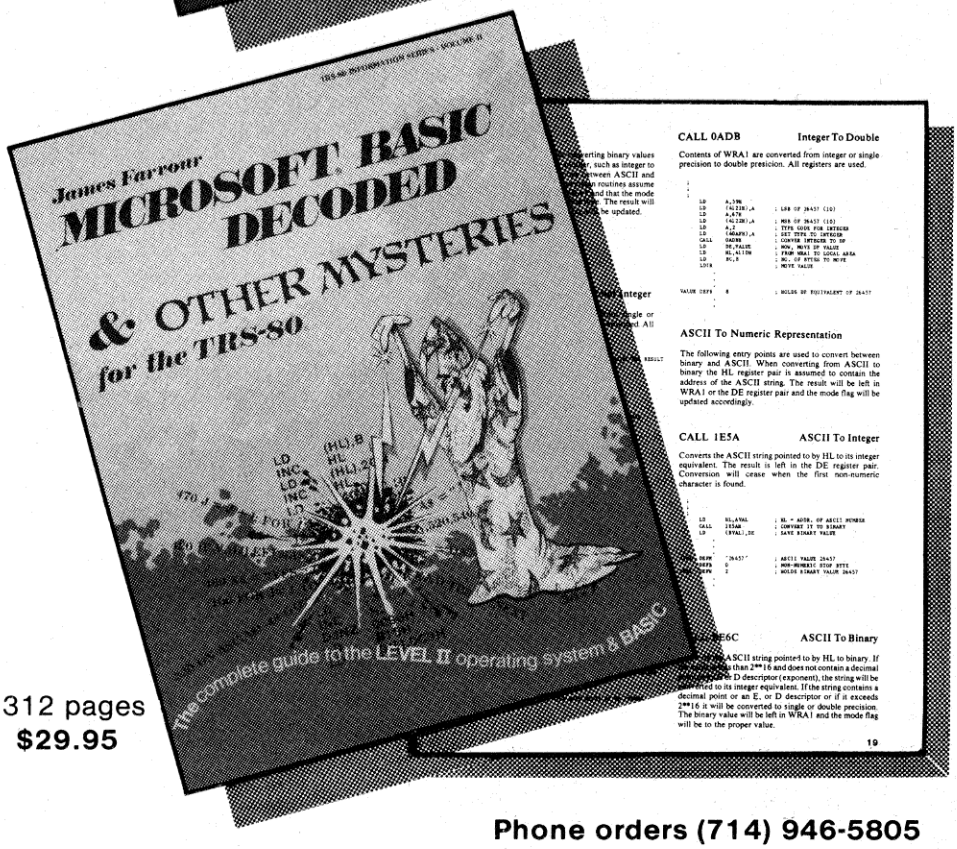
Note: Set Memory Size = 31232. Listing is configured for Level II BASIC only.

'HOW TWO' information!

'.. this is not only a worthwhile book but a great book. My advice is to get it and USE it!' - **William Barden Jr.**



132 pages
$22.50



312 pages
$29.95

TRS-80 Disk & Other Mysteries is the definitive **fixit** book for disk users. More than 130 pages of easy to read, entertaining and immensely useful information - find out how to recover disk files, the layout of information on disks, memory maps, problem solutions ... the list goes on!

Many readers have saved days of work by recreating disk files that were unreadable. With more than 14,000 copies sold so far, **TRS-80 Disk** & Other Mysteries has received favourable reviews in several magazines. Yours for only **$22.50** (plus $1.50 shipping, CA residents add $1.35 sales tax).

Microsoft BASIC Decoded & Other Mysteries is the definative guide to your Level II ROMs. With more than 7,000 lines of detailed comments, and 6 additional chapters packed with information, it is easily the biggest and best book about the Level II ROMs available.

Written by James Farvour, the comment section took more than a year to finish - it even includes the changes for the latest ROM sets Edited by Jim Perry, the founding editor of 80 Microcomputing, the text and comments are understandable.

Exploit the full power of Microsoft BASIC, with the aid of more than 300 pages of tested examples, explanations and detailed comments. Only **$29.95** (plus $2.00 shipping, CA residents add $1.80 sales tax).

Pick them up at your nearest IJG dealer, phone your order in or use the coupon.

IJG Computer Services, ✓37
1260 W. Foothill Blvd.,
Upland, CA 91786

Please send me a copy of TRS-80 Disk & Other Mysteries for $22.50 plus $1.50 shipping. ☐

Please send me a copy of Microsoft BASIC Decoded & other Mysteries for $29.95 plus $2.00 shipping. ☐

OK, send me both IJG books for $52.45 plus $3.50 shipping. ☐

Name .....
Address .....
City .....
State ..... Zip .....
Charge my
☐ Mastercard Interbank Code .....
☐ Visa Expiration Date .....
Card Number .....
☐ Check enclosed
☐ Ship COD ($2.00 extra)

Signature .....

'It has twelve thousand one-liners in it, and every one is great!' - **Dennis Kitsz.**

Phone orders (714) 946-5805

IJG Computer Services,
1260 W. Foothill Blvd.,
Upland, CA 91786

✓See List of Advertisers on page 306

If you think you're good with a soldering pencil, try this project. It may change your mind.

Hardwire the RS-232

Don DeJarnette
1909 6th Ave. East
Tuscaloosa, AL 35401

It's midnight and your printer is busily printing out the last of those 1000 sorted inventory items. The printer stops. Ah, bed at last. But noooo!! The RS-232 board has screwed up again.

The RS-232 board is secured(?) to the 42-pin connector by two small screws. The spring clips on the connector contact the foil side of the circuit board. In theory, this connector works very well. In practice, the screws can be tightened unevenly, dust can accumulate on the contacts and the board can flex. Board flexing was my greatest problem. After a long session the CRT would heat the board, causing it to flex, resulting in poor contact with the connector.

Radio Shack has attempted to cope with this problem by cleaning the contacts, re-tinning the foil with solder and replacing the connector. This was a temporary solution in my case.

I felt the only remedy left was to hard wire the board to the connector.

Roll up your sleeves, take a shot of bourbon to calm your nerves, and pull out the smallest pencil soldering iron you can find. You will need to purchase enough ribbon cable to make 26 connections. Radio Shack has 18 inches of color-coded 16-strand ribbon cable for $3.99 (276-1976). Only about five or six inches of cable should be needed. Good soldering technique is a necessity.

Step 1—Separate all of the wires up to 1 1/2 inches from the end.

Step 2—Strip 1/16 inch insulation from each wire and lightly tin with solder.

Step 3—Trim each tinned end to 1/32 inch.

Step 4—Very carefully tin the 28 pins (Fig. 1) on the connector making sure there are no solder bridges. Note: Pins 1 and 2 are connected to each other; pins 3 and 4 are connected to each other. This accounts for the 26 wires. Tin the connector pins very quickly; this will prevent the heat from melting the plastic body of the connector.

Step 5—Solder the wires of the ribbon cable to the connector. This is the most difficult part of the process. A very short touch of the iron to the wire as it is positioned on the pin is all that is required to make a good solder connection. Alternate the solder points on the pins to each extreme end. This will help pre-

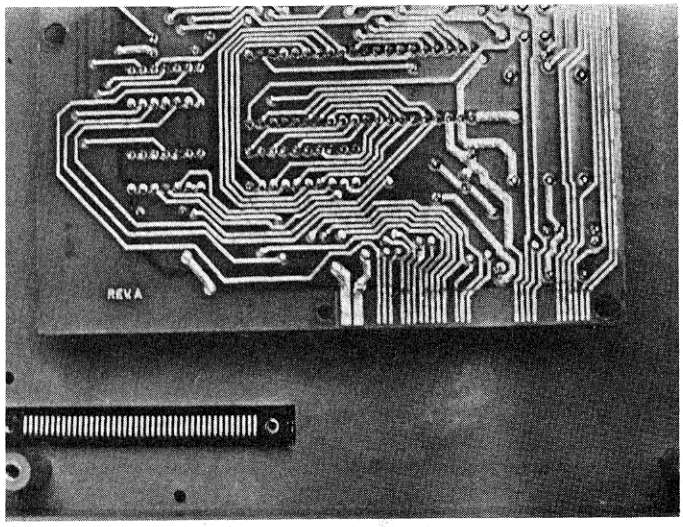


Photo 1. RS-232 Board and 42 pin connector. Note: the circuit board is pictured upside down with the foil contacts in reverse order.

Orient this end to rear of expansion interface (side that 110 volt cords exit from case)

1 ——>	CONNECT
2 ——>	CONNECT
3 ——>	CONNECT
4 ——>	CONNECT
5 ——>	NO CONNECT
6 ——>	NO CONNECT
7 ——>	CONNECT
8 ——>	CONNECT
9 ——>	CONNECT
10 ——>	NO CONNECT
11 ——>	CONNECT
12 ——>	CONNECT
13 ——>	CONNECT
14 ——>	CONNECT
15 ——>	CONNECT
16 ——>	CONNECT
17 ——>	CONNECT
18 ——>	CONNECT
19 ——>	NO CONNECT
20 ——>	CONNECT
21 ——>	CONNECT
22 ——>	CONNECT
23 ——>	NO CONNECT
24 ——>	NO CONNECT
25 ——>	NO CONNECT
26 ——>	NO CONNECT
27 ——>	NO CONNECT
28 ——>	NO CONNECT
29 ——>	NO CONNECT
30 ——>	CONNECT
31 ——>	CONNECT
32 ——>	CONNECT
33 ——>	CONNECT
34 ——>	NO CONNECT
35 ——>	NO CONNECT
36 ——>	NO CONNECT
37 ——>	CONNECT
38 ——>	CONNECT
39 ——>	CONNECT
40 ——>	CONNECT
41 ——>	CONNECT
42 ——>	CONNECT

Orient this side to front of expansion interface (side with on-off switch)

Figure 1. Pin Diagram of RS-232 Board Connector. Remember to connect pin 1 to pin 2 and pin 3 to pin 4 (see photograph).

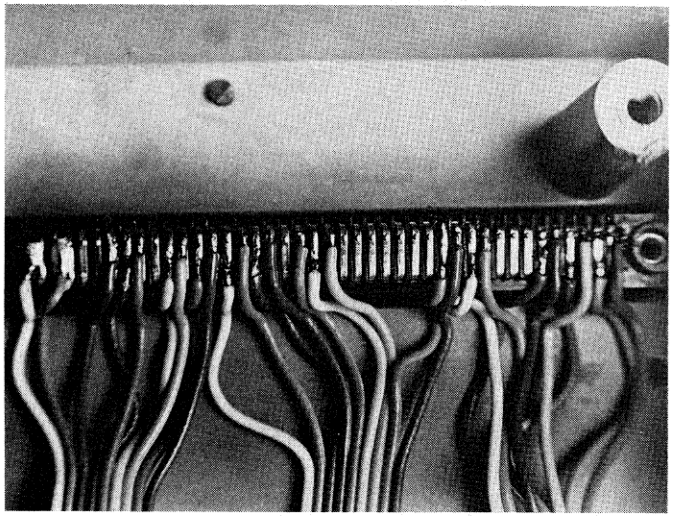


Photo 2. Wired 42 pin connector. Note the alternating solder points.

vent a solder bridge. Note: on pins 1 and 2 lay the wire between the pins and bridge the gap between them, connecting the two. Likewise, bridge the gap on pins 3 and 4.

Step 6—Check for unwanted solder bridges. I find using a magnifying glass very helpful.

Step 7—While pressing down on the top of the connector, very carefully bend and form the ribbon cable around the connector to the base of the RS-232 compartment. Secure the cable to the base with electrical or duct tape. This will prevent the pins from being pulled out of their sockets by the ribbon cable.

Step 8—Follow the color coded wires from the connector to the foil connections on the RS-232 board. Use the two wires from the bridged connections (1-2, 3-4) to key to the wide foil tabs on the board.

Step 9—Solder the cable to the RS-232 board. This is not as difficult as the connector, but watch for solder bridges and alternate solder points.

Step 10—Route the wires conveniently and position the board in the compartment. I used the foam rubber packing from my expansion interface box to hold the board in place. I also used a small amount of silicon caulking compound on top of the connector. This assures that pins will not move.

This process can be somewhat painstaking, but so can sitting through a two hour sort. In the nine months since I have installed the direct wiring of the RS-232 board, I have not had a single malfunction.■

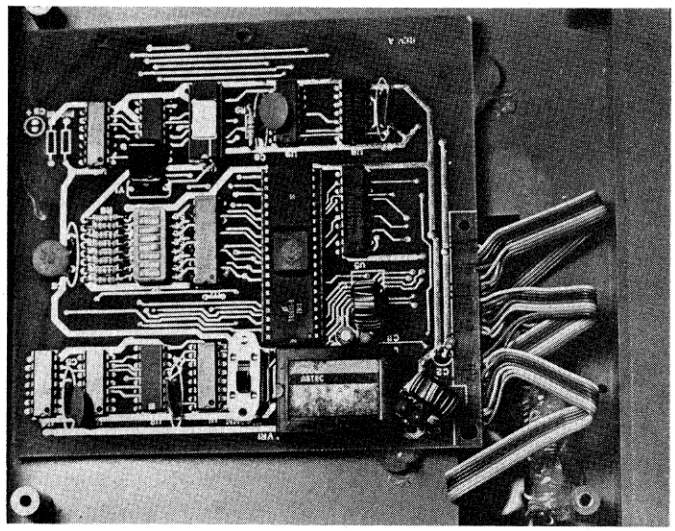
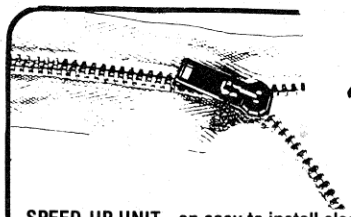


Photo 3. Completed circuit wiring and board placement.



ZIP UP YOUR MODEL I

SPEED-UP UNIT - an easy to install electronic device that enables programs to run 2 to 3 times faster. It's the fastest and finest quality speed-up unit on the market.

- **guaranteed to double processing speed - no additional purchases required.**
- **programs will run up to 3 times faster (5.3 mhz) by adding a Z80B microprocessor and delay line - not supplied.**
- **returns automatically to normal speed during disk and cassette operation - no software patches required.**
- **keyboard power-on light changes color to indicate operating speed.**

$45.00

VIDEO I. Reverses the video display to provide black characters and graphics on an all white screen for a much easier to read presentation. Software controlled. Cures pulling and distortion problems commonly experienced with TRS-80 monitors. For use with TRS-80 monitors only. Assembled.

$24.00

"SATISFACTION GUARANTEED"

Add $2.00 postage & handling - California residents add 6% sales tax -Foreign orders add 15%.

ARCHBOLD ELECTRONICS

10708 Segovia Way Rancho Cordova, CA 95670

(916) 635-5408

Dealer inquiries invited

TIME ...

METHUSELAH™ has time for you and your TRS-80°

The name Methuselah has always been associated with long life. The Methuselah computer clock board with its 24 hour clock and its perpetual calendar is indeed worthy of the title. Methuselah puts state of the art technology into action with the on board four year lithium battery back-up to keep it running even when your computer is off. That means no more fooling around with the software or hardware "clocks" that become Rip Van Winkles when the computer is reset or turned off.

Methuselah has many other timely features. Software patches keep the DOS and BASIC time and clock commands ticking. Only two screws mount Methuselah inside the expansion interface without soldering, clipping, cutting, or jumpering. There is even a spare 1/0 port and four different interrupts available for people who love to tinker.

SPECS: MM/DD/YY, HH:MM:SS and day of the week. Four year lithium battery back-up. Crystal controlled timing (adjustable 32.768 oscillator). Twenty four hour clock and perpetual calendar.

Send check or money order to:

NDM DESIGNS ✓135

6330 W. North Ave.

Wauwatosa, WI 53213

(414) 259-0120

M-S1 ..... $97.00
(add $4.50 P and H)

S-S1 ..... $17.50
(add $2.50 P and H)

(If you wish to use Methuselah and the RS-232 board (26-1145) together, order this option which includes a new cover and connector.)

WI residents add 4% sales tax.

METHUSELAH is a trade mark of NDM Designs

° Reg T.M. Tandy Corp.

✓See List of Advertisers on page 306

Jazz up your displays with segmented screen scrolls.

The Flexible Scroller

Jeff Myers
210 Park Ave.
Hillsboro, OH 45133

I've often wished for a simple way to make the TRS-80 video display more stylish. If not stylish, at least more unexpected than always moving up one line.

A year ago, I devised a machine language program to treat the video display as three separate entities. Downward scrolls, upward scrolls and quick erasing were all available for each third of the screen—left, center, and right. When some of my high school students were adapting this routine to a game program they were writing, one of them goaded me into improving my program by asking whether I could make the movable regions more flexible.

After six or eight hair-pulling hours I had an answer. Yes!

The program is called Flexible Scroller (Program Listing 1). It is a BASIC program including a subroutine to POKE the machine language program into a string variable (lines 49000+), an operating routine (48000) and two examples of how it can be put to work.

When using Flexible Scroller, you do not need to protect memory (the POKE portion assumes a maximum of 16K; on larger systems minor alterations will be needed). During the use of this program you *will* need to protect the variable O and the string O$, however. You can see that in lines above 48000, seven values are POKEd directly into the machine language program so that it scrolls up or down. The variable Ø is in charge of aiming these POKEs properly.

Early in the program the subroutine at 49000+ must be called to POKE the machine language into the string variable Ø$. To make use of the scroller:

- Set S equal to the starting point (left edge) of the vertical strip to be moved (0 to 63 inclusive);
- Set W equal to the width of the strip (1 to 64 incl.), making sure that W + S does not exceed 64;
- Set the flag F$ to U or D (you get to guess what they're for !);
- GOSUB 48000.

Listing 1 illustrates two simple uses of the Flexible Scroller. One of the options shows a random column-erase which is done by calling 48000 sixteen times. To make it scroll down, just change F$.

The second option allows you to specify various combinations of W, S, and F$ and watch what happens. Be sure to try the TRS-80 feature of repeating inputs; enter one set of data, watch it move, then hit enter repeatedly.

The best way to use Flexible Scroller is to keep a copy of lines 48000 to the end. This can be entered when you begin a program in which you anticipate using it or it can be easily appended to existing programs, assuming the line numbers are safe. My tape of lines 48000+ is a weapon I'm frequently glad to have in my programming arsenal.

Invent applications of your own for the scroller: Erase the screen (in either directions or both!) one column at a time. Code and decode messages by vertically zapping columns on the screen. Leave a column or two of messages stationary while other parts of the screen scroll normally during the course of a game or practical program. (In the last case, PRINT@ with a trailing semicolon is useful.)

Listing 2 is a source code listing of this 86-byte program. The data in the BASIC program are decimal values which create this program in machine code.

Special comments have been added where up-scrolling and down-scrolling differ. This was the challenging part of writing the program: inventing a routine which would do both with a minimum of alterations.

Assembly language programmers might try to make it even more flexible by eliminating the need to alter the program at all. (The width and starting point are sent to the program as the argument of USR and register H gets the width and L gets the start. Since S doesn't exceed 63, bit 7 is available for use as an up/down flag and the machine language could alter itself.)

I have trespassed into the disk command vectors at hexadecimal 4152—4159. I do not use disks and this was one way to make the program relocatable. To use the program with a disk system, you'll have to store the variables somewhere else, CALL 000B (hex) and set up storage, PUSH and POP a lot more, or some other alteration.

Whether you want to alter the inner workings or not, Flexible Scroller should provide you with an interesting programming tool. ■

```
0      'FLEXIBLE SCROLLER                    BY JEFF MYERS
1      'CALL 49000 EARLY TO POKE MACH.LANG.ROUTINE INTO
                    STRING O$...*** PRESERVE VARIABLE
     O THROUGHOUT ***
2      'AFTER SETUP, SEND W=WIDTH, S=STARTING COLUMN AN
     D              F$= Ø  OR  Ø  TO SUBROUTINE 48000
     TO PERFORM SCROLL
3      'NOTE:MAKE SURE W + S < 64
100 CLS:CLEAR170:GOSUB49000
110 INPUT"1=COLUMN-ERASE SAMPLE     2=INPUT SAMPLE ";F
120 ON F GOTO 130,170
130 CLS:FORK=1TO100:PRINT@RND(1000),CHR$(64+RND(26));:N
     EXT
140 PRINT@0,"";:INPUT"HIT ENTER TO SEE A RANDOM COLUMN
     ERASED BY 16 'UP' CALLS";W$
150 W=RND(20):S=RND(40):F$="U":FORI=1TO16:GOSUB48000:NE
     XT
160 GOTO140
```

```
170 CLS:FORK=1TO100:PRINT@RND(1000),CHR$(128+RND(63));:
     NEXT
180 PRINT@0,"";:INPUT"WIDTH,START, U OR D";W,S,F$
190 GOSUB48000:GOTO180
48000  'SEND W,S & F$=U OR D
48010 IFF$="U"THEN48030
48020 POKEO+17,128:POKEO+18,63:POKEO+30,90:POKEO+57,66:
     POKEO+63,66:POKEO+68,0:POKEO+69,60:GOTO48060
48030 POKEO+17,64:POKEO+18,60:POKEO+30,82:POKEO+57,74:P
     OKEO+63,74:POKEO+68,192:POKEO+69,63
48060 U=USR(256*W+S):RETURN
49000 O$=STRING$(87,1):O1=VARPTR(O$):O=PEEK(O1+1)+256*P
     EEK(O1+2):POKE16526,PEEK(O1+1):POKE16527,PEEK(O1+2
     )
49010 FORM=O TO O+85:READX:POKEM,X:NEXT:RETURN
50000 DATA 205,127,10,235,33,82,65,115,35,54,0,35,114,3
     5,54,0,33,64,60,237,91,82,65,25,229,17,64,0,175,23
     7,82,235
50001 DATA 225,6,15,197,34,86,65,237,83,88,65,237,75,84
     ,65,237,176,1,64,0,175,42,88,65,237,74,235,42,86,6
     5,237,74
50002 DATA 193,16,224,33,192,63,237,91,82,65,25,237,75,
     84,65,65,54,32,35,16,251,201
```

Program Listing 2.

```
                00100          ;SOURCE CODE FOR  =FLEXIBLE
     SCROLLER=
                00110          ;   BY JEFF MYERS       6/1
    /80
                00120          ;
                00130          ;THIS LISTING IS FOR DOWNWA
    RD SCROLLING
                00140          ;**COMMENTS DESCRIBE CHANGE
    S FOR UPWARD
0000 CD7F0A     00150          CALL    0A7FH           ;GE
    T H=WIDTH,L=START
0003 EB         00160          EX      DE,HL
0004 215241     00170          LD      HL,4152H        ;ST
    ORAGE IN DISK VECTORS
0007 73         00180          LD      (HL),E          ;ST
    UFF START AS 2-BYTE
0008 23         00190          INC     HL
0009 3600       00200          LD      (HL),0
000B 23         00210          INC     HL
000C 72         00220          LD      (HL),D          ;ST
    UFF WIDTH "  "
000D 23         00230          INC     HL
000E 3600       00240          LD      (HL),0
0010 21803F     00250          LD      HL,3F80H        ;**
    FOR UP:LD HL,3C40H
0013 ED5B5241 00260            LD      DE,(4152H)      ;GE
    T START COLUMN & ADD
0017 19         00270          ADD     HL,DE           ;
    TO LEFT EDGE ADDR
0018 E5         00280          PUSH    HL
0019 114000     00290          LD      DE,0040H
001C AF         00300          XOR     A
001D ED5A       00310          ADC     HL,DE           ;**
    FOR UP:SBC HL,DE
001F EB         00320          EX      DE,HL
0020 E1         00330          POP     HL
0021 060F       00340          LD      B,0FH           ;15
     LINES TO MOVE
0023 C5         00350 LOOP     PUSH    BC
0024 225641     00360          LD      (4156H),HL      ;SA
    VE HL=SOURCE
0027 ED535841 00370            LD      (4158H),DE      ;SA
    VE DE=DESTINATION
002B ED4B5441 00380            LD      BC,(4154H)
002F EDB0       00390          LDIR
0031 014000     00400          LD      BC,0040H
0034 AF         00410          XOR     A
0035 2A5841     00420          LD      HL,(4158H)
0038 ED42       00430          SBC     HL,BC           ;**
    FOR UP:ADC HL,BC
003A EB         00440          EX      DE,HL
003B 2A5641     00450          LD      HL,(4156H)
003E ED42       00460          SBC     HL,BC           ;**
    FOR UP:ADC HL,BC
0040 C1         00470          POP     BC
0041 10E0       00480          DJNZ    LOOP
0043 21003C     00490          LD      HL,3C00H        ;**
    FOR UP:LD HL,3FC0H
0046 ED5B5241 00500            LD      DE,(4152H)
004A 19         00510          ADD     HL,DE           ;TH
    IS LAST ROUTINE IS
004B ED4B5441 00520            LD      BC,(4154H)      ; A
     CLEAN-UP OF THE
004F 41         00530          LD      B,C             ; T
    OP (BOTTOM) EDGE
0050 3620       00540 CLEAR    LD      (HL),20H
0052 23         00550          INC     HL
0053 10FB       00560          DJNZ    CLEAR
0055 C9         00570          RET
0000            00580          END
00000 TOTAL ERRORS
```


TRS-80 OWNERS BASIC SLOWING YOU DOWN?

TAKE ZBASIC FOR FAST RELIEF!

Introducing SIMUTEK'S ZBASIC. The truly interactive BASIC COMPILER for your TRS-80! FINALLY! People that don't have the time or the inclination to learn complicated assembly language, have a chance to write PROFESSIONAL QUALITY SOFTWARE in machine language using a subset of LEVEL II BASIC!!

What does interactive mean? It means you have ZBASIC and your BASIC program resident at the same time! You may compile a BASIC program, run it or save it without destroying your resident BASIC program! In fact, jumping back and forth between the compiled code and the BASIC code is one of its finest features!

ZBASIC allows saving your COMPILED PROGRAM as a system tape, (tape version), or as /CMD file, (disk version). THE COMPILED CODE IS VERY EFFICIENT Z80 OBJECT CODE. THE LEVEL II ROMS ARE USED ONLY FOR I/O ROUTINES!!

FACTS ABOUT ZBASIC

1. 16K ZBASIC will compile a 4.8K program. (tape only)
   32K ZBASIC will compile a 17K (tape), 10K (disk) pgm.
   48K ZBASIC will compile a 17K program. (disk only)
   (These are approximate values depending on program efficiency etc.)
2. ZBASIC DOES NOT support disk or tape files.
3. BASIC programs compiled with ZBASIC are between 10-200 times faster than interpreted BASIC!!
4. NO ROYALTIES ON ZBASIC COMPILED PROGRAMS!!
5. ZBASIC programs are only about 1.1 times larger than the average basic program.
6. ZBASIC programs may be used as USR routines from basic.
7. ZBASIC uses INTEGER MATH ONLY to increase speed and decrease compiled program size. Use of Single or Double precision would destroy the beauty of the first "INTERACTIVE COMPILER" on the market!
8. Limited variables: A-Z, A1-Z1, A2-Z2, A$-Z$. Arrays are not supported to decrease memory demands and speed up compiling of programs.
9. COMPILE TIMES ARE TYPICALLY 1 TO 10 SECONDS! THERE IS NO NEED TO USE COMPLICATED COMPILE TIME MODULES!
10. ZBASIC comes with a HIGHLY DETAILED manual describing all important memory locations, commands, variables, warm/cold start entry points and many useful sub-routines for emulating unsupported commands!!
11. Existing programs may be loaded from tape or disk and compiled as long as unsupported commands or variables are not used.

ALL COMMANDS DIRECTLY SUPPORTED BY ZBASIC

FOR	NEXT	STEP	IF	THEN	ELSE	PEEK
SET	RESET	POINT	CHR$	RANDOM	RND	POKE
DATA	READ	RESTORE	END	GOTO	GOSUB	CLS
INPUT	INKEY$	LET	STOP	OUT	INP	RETURN
PRINT	LPRINT	PRINT@	USR	SGN	INT	ABS
SQR	LEN	ASC	VAL	STR$	POS	ON GOTO
ON GOSUB	REM	NOT	AND	OR		

INTEGER MATH: *MULTIPLY /DIVIDE + ADD —SUBTRACT + / — 32767

NOTE: Some commands do not act exactly as BASIC commands act.

TRS-80 MOD I and III or PMC-80 Computers. (Level II Only) NEW LOWER PRICES!

ZBASIC 16K/32K LVII Tape Version + Manual	**$79.95**
ZBASIC 32K/48K Disk Version + Manual	**$89.95**
Both Versions + Manual	**$99.95**
ZBASIC Manual Only (Fully Refundable)	**$25.00**

Model III Version Available 3/1/81

Credit Card or C.O.D. Call **Toll Free: (800) 528-1149**
or send check or money order to:

SIMUTEK COMPUTER PRODUCTS™ ✓19

P.O. Box 13687 Tucson, AZ 85732 (602) 323-9391
(C.O.D. Available $3.00 Extra)

TRS-80 is a TM of Tandy Corp.

✓See List of Advertisers on page 306

A complete assembly language development package for 16K Level II owners.

Editor/Assembler-Plus

Editor/Assembler-Plus
Microsoft
Bellevue, WA
$29.95

Dan Zuckerman
56 Hickory Place
Livingston, NJ 07039

Attention assembly language programmers! Have you ever wished you could assemble, debug, and reassemble your program *ad infinitum* without touching the cassette tape in the process? Your wish has come true! It's called Editor/Assembler-Plus and it's made by Microsoft, the same people who wrote Radio Shack BASIC and Radio Shack's Editor/Assembler. This 12.5 K bug-free machine language program includes features such as: macros, conditional assembly, and many useful editing commands. Best of all, it only requires a Level II TRS-80 with 16K of memory.

The Old Way

For the benefit of the novice, first let me explain Radio Shack's Editor/Assembler and T-BUG machine language monitor. They are used to write, assemble, and debug assembly language programs. After loading the Editor/Assembler tape, type in your source text (assembly language program). A successful editing and assembling session results in an object (machine language) tape and a source (assembly language text) tape. Next, load T-BUG and your object tape. Then, try running your program. Chances are it doesn't work. Use T-BUG to execute a few instructions at a time by using its single breakpoint (similar to a STOP statement in BASIC program debugging).

Unless you are lucky enough to have a printer (or a photographic memory) you will have to refer back to your notes on your program and a table of instructions to interpret those strange looking hexadecimal numbers that T-BUG flashes at you. Upon finding errors, reload Editor/Assembler and your source tape, correct the mistakes, and record more tape. If your program is more than a few lines long this is a very discouraging process.

As previously mentioned, Editor/Assembler-Plus was written by Microsoft. In fact, one of its authors, Mark Chamberlin, wrote the Radio Shack Editor/Assembler. Consequently, Editor/Assembler-Plus is an improved version of Radio Shack's Editor/Assembler.

A Comparison

Microsoft's Editor/Assembler-Plus package includes a 112 page instruction manual (well indexed), a 14 page folding quick reference card, and a tape with Editor/Assembler-Plus and Z-BUG (combined) on one side and Z-BUG alone on the other. (Z-BUG is a machine language monitor similar to T-BUG, RSM-2, and others for debugging machine language programs.) After successfully loading Editor/Assembler-Plus I recommend that you immediately follow any update instructions and make a new working tape.

The loading instructions are easy to follow even if you've never loaded a machine language tape before, as is the rest of the instruction manual.

The most valuable feature of Editor/Assembler-Plus is the assemble into memory option. Using this feature, the option automatically decides where to assemble your object code so that it does not conflict with your source text, symbol table, or the Editor/Assembler-Plus itself. With all these things in safe places, you can easily switch between Editor/Assembler and Z-BUG to edit, reassemble, or debug your program without manipulating tapes or losing your program.

No matter how badly your program crashes, as long as it does not disturb your source text or the Editor/Assembler-Plus, you can reenter Editor/Assembler-Plus without losing anything or touching a tape. Of course, you can also reserve high memory, assemble into memory of your own choice, or generate object tapes without assembling into memory. Larger programs can be handled by using the QUASH command to delete Z-BUG (and the assembler too, if desired). You can then load Z-BUG to debug your program.

Macro and Conditional Assembly

Macros permit you to generate commonly used sequences of instruction easily. For the benefit of BASIC programmers, a macro is best defined as a multi-line defined function or a portion of program with blanks for variables of your choice. Each time a macro is referenced, a particular sequence of code is assembled using unique parameters for that reference. This saves both time and memory space. Using macros can help you develop your own library of easily used routines, create a new language, or even simulate another computer.

The assembler also has an expanded expression evaluator (that's computerese for calculator). Radio Shack's Editor/Assembler is limited to addition, subtraction, logical and, and logical shift. The new expression evaluator can multiply, integer divide, logical or, logical exclusive or, logical not (ones complement a number), and modulo (remainder of integer division). Octal (base eight), hexadecimal (base 16), and decimal (normal base 10) can be used with Radio Shack's Editor/Assembler but Editor/Assembler-Plus also understands parentheses.

Conditional assembly is a function that allows you to assemble sections of your program only if a specified condition is true. The above feature combined with the *equal to* and *not equal to* operators make conditional assembly a useful feature.

Using conditional assembly sections of code can be assembled or ignored based on an equation or a logical arithmetic expres-

sion. These algebraic style parameters are affected by labels set in the beginning of your program. Thus, modifying one label can affect many different sections of conditionally assembled program. A conditional section of source text can contain a conditional section within it. Thus one source text can be used to create many different versions of a machine language program. Programs can be made for disk, tape, screen, printer, Level I ROM, Level II ROM, or different size memories, to mention a few possibilities.

Whenever a program is assembled, a symbol table is created. This tells which symbolic references you have used and which memory locations or data they actually represent. Editor/Assembler-Plus lists these symbols in alphabetical order along with the data they represent. The list is annotated to tell you which symbols represent macros, which change as the program is assembled, and which are involved in possible error conditions.

All error messages are fully typed out and are self-explanatory. There is no need to search through the manual to interpret error messages. You can also direct the assembler to pause when it detects an error, and await your instructions. You can stop and correct the error, continue until the next error, or abandon the wait on error feature and let assembly continue without pausing for errors.

Easy Editing

It's a pleasure to edit source text with Editor/Assembler-Plus. Text can be inserted, deleted, listed, and manipulated on tape. Lines can be copied or moved. The character oriented editor (like the Level II BASIC editor) can be invoked. The X (eXtend) subcommand of the editor can be automatically entered with one command. You can search for particular words (strings). You can even automatically replace all occurrences of a given string with another. Not only can the above functions be performed on single lines but they can all be performed on groups of lines. Thus, you can copy or move a group of lines, edit a section of text all at once, extend an area of text (to add comments), or find and/or substitute for strings within any particular area of text. The entire text can be renumbered at any time. There is never any reason to type the same thing twice or scroll through the entire text searching for a particular line.

With Radio Shack's Editor/Assembler you can specify a line number or the beginning and ending line numbers of a series. Editor/Assembler-Plus lets you specify lines such as the 13th line after line 10 (10 + 13) or the fifth line before the last (* – 5). You can specify line number ranges such as the 23 lines following line 20 (20!23) or even the three lines after the fifth line following the first line in the text (# + 5!3). It is an extremely flexible system!

If you have a printer you'll be pleased to know that Editor/Assembler-Plus has all the Radio Shack Editor/Assembler commands to send information to your printer. You can send output from the assembly or your source text with or without line numbers. If your printer requires software in RAM to run, high memory can be reserved for this and any other use you may desire.

Z-BUG

Z-BUG is a completely new machine language monitor. The feature I like best is its use of the symbol table to reference memory locations and data. For example, to run your program you can tell Z-BUG to go to the location labeled in your source text as START. Unless otherwise commanded it will refer to all memory locations in terms of the labels used in your text. The location following START is referred to as START + 01. This feature can be defeated and locations displayed in octal, hexadecimal or decimal form. The contents of memory can be displayed in disassembled form (Z-80 mnemonics). All addressing (including relative addressing) can be displayed using either labels or numeric memory references. ences.

Program listings can easily be followed because instructions affecting the program flow can be used to automatically determine the next memory location shown. Memory can be displayed in bytes (8 bits) and words (2 bytes) in octal, hexadecimal, decimal, or even the printable ASCII characters. Locations can be modified in any integer base between two (binary) and 16 (hexadecimal) inclusive. One command allows an entire series of memory locations to be displayed together in any of the above forms and you may scroll up and down through memory.

The full expression evaluator of the assembler (as previously described) is available for immediate use in calculator mode. No longer is it necessary to have a hand calculator handy to debug programs. Symbolic references as well as numbers in bases two through 16 may all be used in calculations. By using symbols, a thoroughly labeled program requires very little, if any, numerical manipulation for debugging.

Z-BUG can maintain eight breakpoints at once as opposed to T-BUG's one. Breakpoints are referred to by location and assigned a number (zero through seven). After stopping at a breakpoint you can continue until the next breakpoint or any specified number of following breakpoints. Thus, by setting a breakpoint in a loop you can observe the results of going through the loop any number of times. A built-in single step function allows you to execute a program one instruction at a time while modifying the instructions and their effects on memory, screen, registers, and flags.

All of the commands are logically designed and easy to learn and use. The simple format of the commands is facilitated by a new *escape* character. When the shift key and the up arrow are both depressed a $ symbol results. This $ is different in operation than the shifted four symbol. This new *escape* character is used in many of the commands.

Editor/Assembler-Plus is made foolproof by requiring a two step command sequence for all cassette operations and for the destructive quash command. Any cassette operation command results in the CASSETTE READY prompt, after which you could hit Break to abort the command or hit any other key to confirm it. QUASH (which deletes parts of the system to allow more programming space) results in a QUASH? prompt and requires a similar response. Furthermore, the program is always checking your memory. Attempting to modify a location in fixed memory (ROM) or a defective location in user memory (RAM) results in a BAD MEMORY error message.

Almost Perfect

I can find only one fault in this giant program which fills more than three-fourths of available memory in a 16 K system. There is a short page break every 2.5 seconds when a machine language tape is generated. I find that this space in the tape makes programs slightly longer and more difficult to load. I prefer the continuous tape output of T-BUG. The monitor lacks such luxurious features as tape verify (similar to CLOAD? in BASIC), memory search and compare functions. However, Editor/Assembler-Plus' many other features make up for these functions which would utilize more memory and leave less space for programming.

One feature I felt was lacking was a symbolic listing function which is used to disassemble any supplied machine language tape or an area of memory into the assembler text buffer. By using the superb editing commands, you could easily find all labels needed for relocation and assemble or modify the new text. Disassemblers to accomplish this are available separately (Myosis Disassembler 1.2, for example). If you are willing to do some typing, this feature could be accomplished using the system as provided. You just have to display a screen full of symbolic listing in Z-BUG, jump to the Editor/Assembler, and type the information on the screen into the text buffer (same as typing in a new program). This is proof of the feasibility of implementing this feature.

Editor/Assembler-Plus is all a beginning assembly language programmer (with a 16 K Level II TRS-80) needs to have a complete assembly language development system. This powerful, easy to use system is sold for about $30—that's $15 less than buying Radio Shack Editor/Assembler and T-BUG separately. A good introductory programming book with information on Z-80 instructions and mnemonics is needed to complement the documentation provided.

Programmers without an assembler and Radio Shack Editor/Assembler owners tired of waiting for tapes load and desiring the new features of Editor/Assembler-Plus will find it well worth the money. Radio Shack Editor/Assembler owners might even consider their initial investment well worth it for the excellent documentation that is provided. ■

An observing aid for students of the species.

A Field Guide To Computerists

Chuck Doherty
32 Meadowood Drive
South Dartmouth, MA 02748

This is quite a country we live in. Where else could one find such a wide range of different people? And the computer boom of the last few years has spawned a totally new group from all the others. This group has managed, in a few short years, to carve a permanent nitch for themselves in society. This group is, of course, the computerist.

I'm not referring to the computer professional, who spends his eight hours at the helm of some IBM monster, and at five flips the switch to become Joe American, Regular Guy. I'm talking about the man who rushes home from work, pats his wife, kisses the dog and disappears until the wee hours into that mysterious little room with the phosphorus glow.

This is not to imply that all computerists are alike, quite the opposite is true. The purpose of this article is to guide you in learning the many sub-groups, and to point out the differences between them.

The Whiz Kid
(Youtharious Technicalia)

The easiest to spot of all the sub-groups, is the whiz kid who can be identified at some distance. Plaid pants and a different plaid shirt is usually the tip-off along with a plastic shirt-pocket protector containing an inordinant amount of pencils. Another sign is a leather calculator pouch hanging from the belt. If you see any of the above combined, you can be sure you've got a classic.

By their thirteenth birthday, most whiz kids know more about computer hardware than most senior engineers.

Don't try to find the whiz kind at sporting events or at discos; try the local computer store or library instead.

The Computer Pioneer
(Forefrontus Electro)

If a house in your neighborhood has solar panels or a windmill, it may also have one of these. The Computer Pioneer looks like the guy in *Popular Science's* "Wordless Workshop" section. He knows that in a few years computers will control robots delivering mail at 300 m.p.h. and he's going to be ready. He also insists that his wife use a computer to figure how many pounds of hamburger to use for four people when the recipe is for only two.

All in all he's a terrific guy to have for a neighbor, especially if you ever need to borrow a benzene powered, home built, metal detector.

> *"The easiest to spot of all the sub-groups, is the whiz kid who can be identified at some distance."*

The Computer User
(Ineptus Bythebookia)

The computer user is a firm believer in the old addage: "If man were meant to have lowercase, it would be inside." His favorite activity is browsing the corner Radio Shack outlet and he laughs at the idea of writing his own software. This is the guy who, as a child, searched all over town for a certain brand of glue (made by the same people who made his model car kit) because the instructions said so.

He also believes that computers are the wave of the future, but doesn't hope to be their master; he only hopes to be able to talk his way into a job.

The Junior Businessman
(Financia Multipulis)

Every town has a few of these. This is the fellow who runs the shop that sharpens saws, makes 3-D magnetic signs, rubber stamps and used to sell CB radios. The Jr. Businessman has taken almost every correspondence course known to man, and views the computer as the best business opportunity to come down the pike since locking gas caps. One wall of his shop is devoted to pre-packaged software and back issues of computer magazines. He knows that riches and prosperity are right around the corner, just as soon as he gets around to cleaning up that back room and fixing the air conditioner. (He knows how to do it himself; he took a course.)

The Visionary
(Misinformia Wellintentia)

The visionary heard from a friend that computers can fix dinner, scare away burglars, keep all his records and teach

the kids fluent German just by pushing a few buttons... nothing to it. Boy, is he in for a surprise.

The Computer Student (Idiot Peripheralis)

The computer student is going to make it big in the world of tomorrow. He is able, in one breath, to recite entire instruction sets of over two dozen different microprocessors. However, he cannot tie his shoes without an illustration.

The Big-Time Hustler (Richis Swiftis)

We've all heard stories of these fellows, but few have ever been met face-to-face. He knows there is money changing hands out there somewhere, and is determined to get his grimy paws on some of it. These are the fellows you see with hats over their faces as reporters try to get an interview. Most are well versed in retirement land sales and commodity options.

The Social Outcast (Dullis, Dullis, Dullis)

By far, The Social Outcast is the least interesting person you will ever meet. However, at the keyboard, he is in charge. He is a brilliant programmer, and understands both software and hardware throughly. But, outside of computer-related discussions he's at a total loss. The Wife and kids are equally as dull. Pass out the No-Doze if this man has a comment at your computer club meeting.

Of course, not every computer user falls into one of these classifications. There are also many others, some so diverse that they only have one member. Also do not forget the indirectly related groups, such as the computer widow, the computer orphan, and the infamous computer salesman.

In the future perhaps a modern Audubon will do a more in-depth study of this group, giving us a standard reference guide to the American Computerist. ■

SAVE more than 50%

FOB Reston Virginia
MasterCard, VISA Check, MO, PO.

NEW! $1995 RO version only

USED in excellent condition **RO $995; KSR $1495**

Rugged and well-constructed; available in **KSR** and **RO** versions; feature 96 ASCII (upper & lower case) **plus** 27 graphics characters in a 5X7 (optionally 5X9) dot matrix. Prints bidirectionally (logic seeking) at 180 char/sec on std pin feed paper (up to SIX part) in **red and black.** Tractors are adjustable from 3 to 15 inches; split platen versions also available. Electronic top of form/forms length control and six selectable character print densities (10, 12, and 17 cpi plus elongated in each). 1K buffer and 110-9600 Baud RS-232C interface is standard; additional buffer may be added and a Centronics-compatible parallel interface is available. Free-standing pedestal unit.

DSE ✓368 **Digital Systems Engineering**

12503 King's Lake Drive, Reston VA 22091 (703) 620-2994

ALSO AVAILABLE: New Centronics and Integral Data Systems printers at 15-20% below list; also, used printers of several makes. **Call for information!**

TRS-80 **COLOR COMPUTER**

RAMCHARGER 32K UPGRADE

- EXTEND MEMORY FROM 16K to 32K
- 100% COMPATIBLE WITH EXTENDED BASIC
- NO SOLDERING OR MODIFICATION
- FITS INSIDE COMPUTER
- $99.95

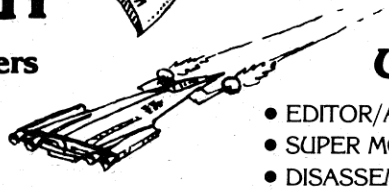
ADVENTURE

COMBAT THE POWERS OF DARKNESS AND EVIL! CAN YOU RECOVER THE TREASURE OF THE GOLDEN SORCERER BEFORE HIS MINIONS OVERCOME YOU. A CLASSIC ADVENTURE FOR ENDLESS HOURS OF FUN AND EXCITEMENT.

$19.95

SPACE TRILOGY

Space Invaders
Meteoroids
Space War



- THE BEST GAMES AVAILABLE
- HIGH RESOLUTION GRAPHICS
- FAST, MACHINE LANGUAGE
- COMPATIBLE w/ EXT. BASIC
- $21.95 each, $59.95 for all three

UTILITIES

- EDITOR/ASSEMBLER $34.95
- SUPER MONITOR 24.95
- DISASSEMBLER 19.95
- EPROM PROGRAMMER 74.95
- MAGIC BOX 24.95

LOAD MOD I/III TAPES INTO THE COLOR COMPUTER

DEALER INQUIRIES INVITED

SPECTRAL ASSOCIATES ✓132

141 Harvard Ave.
Tacoma, Washington 98466
(206) 475-8483

WRITE FOR COMPLETE CATALOG

ADD 3% FOR SHIPPING

VISA OR MASTERCHARGE ACCEPTED

✓See List of Advertisers on page 306

A powerful tool with minor problems.

Microsoft's Compiler For The Model II

Basic Compiler (Model II)
Microsoft
Bellevue, WA
$400

James L. Waggoner
1854 Wedgemere Road
El Cajon, CA 92020

As a programmer who began his career on IBM 7094s that occupied entire buildings, you'd think I'd be realistic in my expectations of new products, especially compilers!

Reasons for Buying a Compiler

First, let me give you my reasons for purchasing a compiler for the Model II. Radio Shack designed the Model II so the user of a 64K machine would be able to use all 64K for programs. With the disk-based BASIC interpreter occupying 28K to 29K, the programmer is left with 35K to 36K for his programs.

My first reason, then, for buying a compiler is that I could make more memory available for BASIC programs.

The compiler saves memory by compiling statements and producing object code as opposed to ASCII bytes, and by including only those subroutines (e.g., PRINT and LPRINT) that are actually used by the programs. For example, a 9000 byte BASIC program may produce a 15,000 byte object file (/CMD file). But you save with the compiled version at 15,000 bytes because you don't need the 28,000 byte interpreter or 9000 bytes of program, making your net savings 22,000 bytes.

My second reason for buying a compiler is that programs will execute faster.

An interpreter examines each program statement and determines what to do with it when it is encountered. A compiler determines what operations are necessary to execute a statement and produces machine language instructions that are then executed when the program is run. This obviously avoids the extra steps introduced by an interpreter each time a statement is executed.

In general, the increased speed would not be noticed in print operations, screen displays, or interactive sessions, since these activities are limited by the speed of the devices (I/0 bound) rather than the speed of the microprocessor. I hoped, however, that the compiler would speed up arithmetic calculations, string searches, and other internal operations.

I invested some money in phone calls to Microsoft to assure myself that the compiler would run on a single-drive Model II.

No Clicks, Hums or Displays

In typical "old hand" programmer fashion, when I received the compiler, I gave the documentation a cursory glance and popped the eight inch diskette into my single drive and hit RESET. Much to my surprise, I was not greeted by the usual clicks, hums, and displays. Instead, I received a message saying there was no system on the disk.

Not being one to give up that easily (programming requires tenacity), I booted a good disk, removed it, and inserted the disk with the compiler on it. I requested a directory that produced a list of files that agreed with what the documentation suggested should be there. This small triumph encouraged me to spend the next several hours between reading the documentation and fruitless attempts to either copy the system onto the compiler disk or copy the compiler files onto a system disk.

Even a programmer's tenacity has limits. I finally decided to get some sleep, and as I drifted off I began composing the conversation that would take place during my angry phone call to Microsoft the next day.

The conversation the following morning went something like this:

"My compiler doesn't work," I said to the customer representative. (Programmers tend to overstate their cases.)

"Did you copy the files to system disk?" he responded.

"I tried. How do I do that with one drive?"

"You can't. You have to take the disk we sent you to a Radio Shack store or a friend with two drives and make the transfer," he replied.

"You said I could run the compiler on a single-drive system."

"You can, but first you need two drives to transfer the files to a system disk."

"What if I lived in Cutbank, Montana, four hundred miles from the nearest Radio Shack computer store?" (Programmers are clever at thinking up hard questions.)

"Believe me, I get calls from those people too," he retorted.

Realizing that the conversation was leading nowhere I asked, "Are there any other surprises in store for me?"

"No," he answered.

End of conversation.

Fortunately the distance from my office to the nearest computer center is only a few miles. I sure feel sorry for that guy in Cutbank!

That evening I figured I was all set to run my BASIC programs through the compiler and produce programs that ran like greased

lightning. (Programmers are also eternally optimistic.)

Documentation

Let me explain the organization of the documentation supplied by Microsoft. It's divided into several sections. The first and largest section deals with the commands available in the Microsoft version of the BASIC language. As a part of the description available with each command, a line is included stating the version for which the command is valid. This line may state that a particular command (instruction) is valid for 8K BASIC, Extended BASIC, or Disk BASIC. (Notice I did not mention the BASIC Compiler.)

This large section contains several appendices which explain differences among the various usages. There is also an appendix which describes the peculiarities of the version for the compiler. This section is followed by a section called the "BASIC Compiler User's Manual" for the CP/M usage, a section on the macro assembler and one for the linking loader.

The information dealing with the Model II version of the compiler is contained in six pages appended to the front of the manual. The appended information deals mainly with the commands (instructions) which are *not* legal in this compiler version. The user is left with the assumption that, if it isn't strictly forbidden, it must be okay.

After discovering in the first six pages that dashes "—" must be substituted for slashes "/", :TT (for CRT display), not TTY: and :LP for line printer, I typed the command line for the compile:

```
BASCOM TEST,:TT TEST = TEST-N
```

The disk drive commenced to spin furiously. Lines appeared on the CRT indicating that Microsoft's latest and greatest was up and running. I sat back triumphantly, expecting a blur of lines to scroll across the screen. After several seconds, two more lines appeared which indicated completion of the compile. Strange, I thought, that an 8000 byte program would compile without errors and produce so few lines of output on the CRT. Perhaps there's an error in the command line?

Since the completion of the compile had left me at the TRSDOS READY mode, I requested a list of the directory. Sure enough, there was a file called TEST/REL. It looked very short, so I examined it with the TRSDOS command to list it to the CRT. It looked short because it was short. In fact, it was almost non-existent.

After several more attempts using various permutations of the command line (e.g., list output to screen, list output to printer, list source only, list source and object, don't create object file, etc.), I decided I needed a beer. While sipping my beer, I glared at the CRT and vowed it would not get the better of me this night. (Beer aids tenacity.) Suddenly a thought. Perhaps the compiler doesn't accept the compressed format for BASIC. I quickly loaded the BASIC interpreter, read my program from the disk, and saved it in ASCII using the ",A" extension. At this point, I must confess that in an appendix it does state that the compiler will accept ASCII files.

000 Fatal Errors

I returned to TRSDOS and entered the BASIC compiler command with which I was now gaining a certain intimacy. The same furious disk activity began, and then the CRT was a blur of errors scrolling across the screen.

Success! Well, compared to the results so far it was a success.

After examining and eliminating several errors (bear in mind that this program ran without problems in the interpreter mode), I ran across an innocent looking error labelled "LL." Intrigued, I reached for the Microsoft manual and thumbed to the list of compiler error codes—"LL" meant "line too long."

Examining the line displayed on the CRT to which the error code apparently referred, I counted the characters. The line was only 28 bytes long (back to the documentation). After intensive investigation (and another beer), I found a reference which said, in effect, that the compiler will not accept a physical (as opposed to logical) line greater than 127 bytes.

I carefully recounted the characters displayed on the line. There were still only 28. I examined the rest of the listing. My eyes wandered down to the next line. Now this line, I thought, is definitely longer than 127 bytes. I checked several other lines with line length errors indicated and discovered a pattern. It wasn't the indicated lines that were too long, but the lines following.

Sensing victory was at hand, I quickly severed the lines at a convenient point (less than 127 bytes in length), re-typed the severed portion on a separate line and recompiled the program. After several anxious seconds, I was rewarded with that most elusive of remarks "0000 FATAL ERRORS."

The Purpose of the Loader

Flushed with victory, I plunged on to the next step in creating a loadable object program, The Linking Loader. According to the Addenda to the BASIC Compiler User's Manual, I was to type "L80 TEST-G" to load and execute my program or "L80 TEST-E" to exit and save a copy. If I wished to relocate the program at a base address other than 3000 hexadecimal, I could use the "-P";address or "-D":address switch. Since Microsoft didn't think I needed to know the difference between the two or give any examples to follow, I decided not to get that fancy on my first attempt.

I sat back and reflected upon the purpose of the loader. The linking loader processes the compiled program and searches for references to subroutines (subroutine calls). When a subroutine reference is found, the loader searches a file of subroutines, the subroutine library, and extracts the required routine for inclusion in the object file. The Microsoft subroutine library is approximately 45,000 bytes long. You could expect a program that used every conceivable variation of every command to require the inclusion of one copy of every subroutine in the library.

Conversely, limiting the variety of commands in a program would be a way of reducing the object file size. For example, if a simple program contained several instructions requiring addition and only one or two requiring multiplication and further, assumes the multiplication subroutine is 3000 bytes long, you could save 3000 bytes (more or less) by writing the multiplications as repetitive additions. (An interesting project would be to determine the size and speed of the various subroutines and select the shorter and faster routines when writing your programs.)

Well, back to the loader. The disk was working furiously and very little other activity was apparent. Searching and selecting the various subroutines from the library took several minutes. When the loader has completed its task, four hexadecimal values are displayed on the screen (two of the values are the same). As an example, say the values were 3000, 3A61, and 6AB1 (the 3000 appearing twice). These values are required for the TRSDOS DUMP routine, which saves the object file in a command file. The 3000 represents the beginning of the program.(All compiled programs will start at 3000 unless the "-P":or"-D":options are used.) The 6AB1 represents the location

FUNCTION PERFORMED	TIME (IN SECONDS) FOR 2000 EXECUTIONS COMPILED VERSION	INTERPRETER VERSION
B% = B%*(10/10)	1	15
C = C**(10/10)	1	14
LOG(I/7)*	34	41
LOG(4.155/7.2)	31	74
SQR(I)*	30	63
I 1/3 (CUBE ROOT)*	58	129
$\frac{-B+SQR(B-4*A*C)}{2*A}$	100	182

*I = 1 to 2000

Table 1.

Mayday!™

THE UNINTERRUPTIBLE POWER SUPPLY

. . . that keeps your computer on when the power fails . . .

Mayday protects the computer and disk system from power surges, sudden drops in voltage, or a complete disruption of power.

Most problems operators or programmers have are caused by voltage or current interruptions of the computer.

There are 12 different Mayday UPS power supplies, one of which is specifically designed to handle your computer system from 50 watts up to over 600 watts.

Protect your time and investment. One power failure could well cost you the price of the Mayday. Prices start at $240 for the 150 watt system. (Line surge voltage regulator protection is available at additional cost).

For more information, please call or write.

from•••

✓151

Sun Research, Inc.
Box 210 New Durham, NH 03855
(603) 859-7110 TWX 510-297-4444

COOSOL DATA LOGGER IMPACT PRINTER

FEATURES INCLUDE:

- Uses Standard Typewriter Ribbon
- Micro Processor Controlled
- Can Operate Continuously— No Thermal Problems (Has an all metal print head)
- 5 x 7 to Larger 10 x 7 and Larger 10 x 14 Dot Matrix Character Generator
- Standard 96 ASCII Character Font
- Upper and Lower Case Printing
- Up to 88 Characters Per Line
- Single Line Print Rate Is 160 CPS
- Average Print Rate Is 60 CPS For Ten Lines
- Graphics Capability With Extended Character Modes
- Programmable With 32 System Level Software Commands
- Standard Parallel and Serial Interface
- Software and Hardware Reset Interface
- Software Line Counting For Paging
- Baudrate Select From 110 to 9600
- Manual Paper Advance
- Manual Selftest and Reset
- Adjustable Tractor Width From 1 to 9½ Inches
- Interfaces with Apple, Atari, OSI, T.I., TRS-80 and the List Goes On *

$495 Kit, 101B-80KE **$545 Assembled & Tested 101B-80E**

*Registered Trademarks of Apple Computer Inc., Atari Inc., Ohio Scientific Inc., Texas Instruments Inc., Tandy Corp. respectively.

FACTORY DIRECT ✓78

COOSOL, INC. P.O. BOX 743, ANAHEIM, CA 92805 (714) 545-2216 7 Days a Week

where execution of the program is to begin.

I entered the TRSDOS DUMP command:

```
DUMP MYPROG/CMD
START=3000,END=6AB1,TRA=3A61
```

which dumped the object file to the disk in a few seconds.

At last, I was ready to perform the ultimate test. At the TRSDOS READY level, I typed in "MYPROG/CMD". The disk activity light came on and the first menu in my program appeared on the screen. After checking several of the features of the program, I decided that I had indeed created a compiled version of my program that actually worked just like the interpreter version.

Since I finally had the compiler figured out I decided to perform a few experiments to determine what kind of increase in processing speed I could expect. I wrote a small program in BASIC and debugged it. Once I had it running in the interpreter mode, I made the changes required for the compiler (such as deleting the CLEAR statement) and saved an ASCII version to compile. I then ran both versions of the program and, using the internal clock in the Model II, printed the time required to perform the various functions. As I expected, there was little difference in the screen display time (although the compiled version appeared slightly faster) or the printout. A significant difference in the string search times was indicated.

The string search test consisted of establishing a 2000 item array with a five-character pattern in each item. A loop was established to search the array using the INSTR$ function. I set the last item in the array to the pattern I was searching for. The interpreter version of the program took 16 seconds to find the required item. The compiler version took just four seconds, a four to one advantage in processing speed for the compiler. Upon examining the programs, I noticed I had used a single precision variable for the loop counter. I changed the variable to an integer type variable in both versions of the program, recompiled, and re-ran the test.

The interpreter version run time was reduced by a second or two (the granularity on the clock is one second), but, the compiled version now ran in only two seconds. This would indicate that programs requiring searches of large numbers of string items would run seven or eight times faster using compiled versions.

Table 1 contains data for various simple tests I ran to the execution speed between interpreter and compiler versions. Each test consisted of executing the indicated function 2000 times and displaying the start and stop times. The execution times indicated are exclusive of any interactive input or display times. The granularity of the clock was one second, and the times indicated include the loop processing time as well as the calculations. I made no attempt to optimize the routines.

Updates

Recently, I received the latest version of the Compiler and a revised addendum. Microsoft's latest version, 5.2, adds the include % function that allows a programmer to create subroutines and add them to a program without re-entering the code (a very handy function). This version also eliminates the step of dumping the object code to a command file during the load process. A new compile switch has also been added to allow compiling using one set of BASIC conventions, and execute using another. Considering all the improvements the latest version is a significant step forward.

After making another visit to the local Radio Shack computer center to transfer the latest version to a system disk, I eagerly anticipated exercising the compiler. I transferred my 29,000 byte BASIC program to the system disk.

I was expecting to encounter similar problems with the line lengths, etc., but figured I would try the largest program first just to see how it fared. To my amazement (apologies to Microsoft for my doubt), the program zipped through the compile in less than four minutes. No line length errors; the new version accepts lines greater than 127 bytes. The four indicated "fatal errors" consisted of reserved words which were imbedded in variable names, a no-no when using "-4" compiler switch.

Still dazed from my initial success, I corrected the indicated errors, re-ran the compiler and decided to attempt the loader. Not wishing to push my luck too far, I did not attempt to use the added feature which eliminates the necessity for dumping the object code. (I later verified that this function does work.)

I typed in the loader command and sat back to wait. In less than four minutes the now familiar start, end and transfer addresses appeared, indicating a successful load. I dumped the object code to a command file and not yet believing my good fortune, typed in the command file name. The first menu of the program appeared on the screen. After exercising several of the features of my program, I had to admit that everything appeared to be working. The 29,000 byte source file was now a 7,000 byte object file, a savings of 22,000 bytes.

A Different Kind of Animal

To summarize my experience with the Microsoft BASIC Compiler for the Model II, I would have to say the greatest deficiency is the documentation. Microsoft has fallen into the trap of trying to make one documentation package serve for every conceivable application.

A compiler is a fundamentally different animal than an interpreter and deserves separate instructions. Five or six pages of addendums cannot begin to provide the detail required to effectively utilize this powerful tool. ■

TRS-80*

SAVE A BUNDLE

When you buy your TRS-80™ equipment!

Use our toll free number to check our price before you buy a TRS-80™ . . . anywhere!

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation.

full Radio Shack warranty

✓148

SALES COMPANY
1412 WEST FAIRFIELD DR.
P.O. BOX 8098 PENSACOLA FL 32505
904/438-6507
nationwide 1-800-874-1551

TEACH YOUR CHILDREN

Learning to count money by Malcolm Nygren

A three-program learning system that teaches the important skill of counting money.

1. Counting Coins—Instruction and drill in counting pennies, nickels, dimes and quarters.
2. Shopping Trip—Buy goods in various stores; count out the payments and earn "purple stamps" for a right answer. Three speed levels.
3. Check-Out—Run your own checkout counter. Learn and practice how to make change.

Learning to count money by Malcolm Nygren features superior graphics and is available for TRS-80 Model I—Level II—16K on cassette only. Shipped postpaid by first-class mail

Each program **$6.95**—*all three* **$19.95**

ALSO AVAILABLE

ALPHA—Alphabet recognition for preschoolers
SIGMA—Addition problems for Grades 1-3
SIGMA-EX—Addition problems for —the younger or slower learner
SPE_L—Spelling practice for Grades 2-4

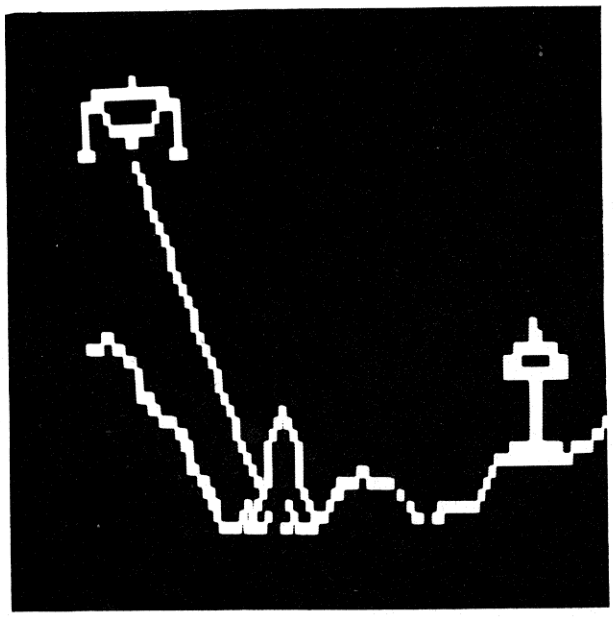
Available on cassette only. $5.95 each. Two for $11. All four for $20.00.

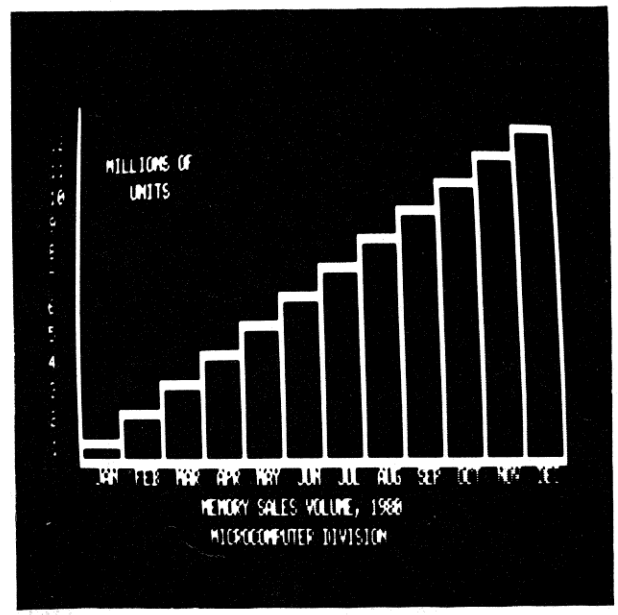
✓104

Mercer Systems Inc.
87 Scooter Lane
Hicksville, N.Y. 11801

✓See List of Advertisers on page 306

ANIMATION!





ANIMATION **PROFESSIONAL**

GRBASIC OFFERS FULLY INTEGRATED **BASIC** GRAPHIC COMMANDS FOR THE MODEL I AND MODEL III! LINES! SHAPE TABLES! SCALING! ROTATIONS!

GRBASIC extends Level II or DISK BASIC to include an easy-to-use graphics command set. A single BASIC command allows the user to draw a line between *any* two **pixels** on the screen. The longest diagonal can be drawn in less than 7/100 second! Coordinates can be chained to allow complex figures to be drawn by a single BASIC program line in less than a second!

GRBASIC allows the definition of shapes. Once defined, a shape can be **rotated, scaled** up or down in size, drawn anywhere on the screen in less than a second, and can even be drawn totally or partially "off" the screen in extended space! And all with short, simple BASIC commands! Even multiple shapes are no problem!

GRBASIC is **not** a string-packer or machine-language USR-called utility. GRBASIC is fully integrated into Level II and DISK BASIC. There is nothing on the market that offers its graphic features, except possibly the Apple II computer!

TRS-DOS AND TRS-80 ARE REGISTERED TRADEMARKS OF TANDY CORP.
NEWDOS 80 IS A REGISTERED TRADEMARK OF APPARAT, INC.

GRBASIC will allow the professional user to produce data graphs and displays with unbelievable ease. The data graph pictured above was produced by a few simple BASIC statements and was drawn in under 1 second!

3-D animation from BASIC is now a reality! The game pictured above, taken from a demonstration program included with GRBASIC, pictures an alien ship attacking a moon base. This demonstration is written completely in BASIC and is superb!

GRBASIC is available for Level II BASIC on cassette. DISK versions support TRS-DOS 2.3 and NEWDOS 80 (please specify which!), including BASIC * recoveries and full DOS integration. Memory overhead is only 1.5K. Documentation is extensive, and includes numerous examples.

GRBASIC cassette — $19.95
GRBASIC diskette [TRS-DOS 2.3] —$24.95
GRBASIC diskette [NEWDOS 80] — $24.95

Med Systems Software ✓128
P.O. Box 2674-Y Chapel Hill, NC 27514
(919) 933-1990

GUARANTEE AND ORDERING INFORMATION ARE UNDER THE SLEEPING DRAGON ON THE NEXT PAGE. →

LABYRINTH!

Labyrinth is not easy. Waking a sleeping watch-dragon is the least of your troubles. Somewhere in this nightmare of tunnels lurks an evil minotaur. To escape, you must kill it. And survive.

Only the legendary light sabre of Dnev can kill the minotaur. It is secreted away in stygian darkness. To get it, you must deal with cave bears, gnomes, pits, wraiths, and much more. You must avoid the minotaur at all costs.

Alas! Once armed with your light sabre, the minotaur flees! What treasures must be found and used as bait? Why is the maiden so beautiful? What lies beyond the fog . . . .

3-D PERSPECTIVE GRAPHICS

Labyrinth features the full screen 3-D perspective graphic displays that have made Asylum and Deathmaze 5000 best sellers. You can actually see what you are doing and where you are going! The mazes and buildings are bit-coded. This allows us to store **gigantic** mazes in small amounts of memory. These programs are **not** just a series of stored pictures. Our mazes typically contain **over 600 locations.** Further, machine-language programming gives instantaneous graphics generation and game response!

LABYRINTH places you in a huge maze of tunnels inhabited by gnomes, ghosts, witches, and an evil minotaur. You must find the weapons and treasures needed to destroy the minotaur before he destroys you! There is food enough in the maze to hold out for months!

TRS-80 Level II 16K or Model III 16K $12.95

ASYLUM places you on a cot in a small room. Periodically, a janitor lobs a hand-grenade through the window of your locked door. What you do next could mean survival and escape! It could also mean permanent residence in the home for Deathmaze survivors! To leave, you will have to deal with guards, fellow survivors, doctors, the infamous Crazed Carpenter, and much, much more. Don't expect to get out any time soon! There are over 1200 locations!

TRS-80 Level II 16K or Model III 16K $14.95

DEATHMAZE 5000 places you in a gigantic five-story building. There is only one goal. **ESCAPE ALIVE!** Monsters, dogs, vampires, and other vile horrors will plague your every step as you struggle to survive one of the most challenging adventures ever written. As of December 20, only two people outside the Med Systems' staff were known to have escaped!

TRS-80 Level II 16K or Model III 16K $12.95

✓128

Med Systems Software
P.O. Box 2674-Y Chapel Hill, NC 27514
(919) 933-1990

SATISFACTION GUARANTEED!

Asylum, Deathmaze 5000, Labyrinth, and GRBASIC are guaranteed to be the most incredible graphic packages you can buy. If for any reason you are not satisfied with these products, return your order within 14 days for a prompt and cheerful refund.

ORDERING INFORMATION

Orders are processed within five working days. We pay all postage and handling within the U.S., Canada, and U.S. territories. European orders please include $3.00 for air post.

☐ Asylum	($14.95)	$ _____
☐ Deathmaze 5000	($12.95)	$ _____
☐ Labyrinth	($12.95)	$ _____
☐ Adventures on Disk	(add $4.00)	$ _____
☐ GRBASIC Cassette	($19.95)	$ _____
☐ GRBASIC TRS-DOS Disk	($24.95)	$ _____
☐ GRBASIC NEWDOS 80 Disk	($24.95)	$ _____
	TOTAL	$ _____

Name _____

Street _____

City _____ State _____ Zip _____

Computer:
☐ TRS-80 LII 16K ☐ Model III 16K

☐ Mastercard ☐ VISA ☐ check

MC or VISA # _____

Expiration Date _____

✓See List of Advertisers on page 306

Use this subroutine to generate formatted input commands in your business software.

Dollars and Sense

Tom Andrews
WLKI Radio
Angola IN 46703

If you write much business software in BASIC, you undoubtedly appreciate such conveniences as the print using command in Microsoft BASIC.

But how about a formatted INPUT command? What a boon that would be for inputting dollars and cents amounts!

The subroutine here will provide a solution for TRS-80 users, and many other Microsoft BASIC programmers too. The subroutine can be renumbered and relocated as you like, but wherever you put it, it will provide nice, neat dollars and cents input, with the numbers marching from right to left, and with the decimal point and commas all properly placed.

To use the subroutine, set the value of variable FL to the maximum number of digits to be input. If you do not want the screen to increment to the next line after you hit the carriage return, set FF = 10. Then GOSUB to the routine. When the operator hits return after entering the last digit to be input, the subroutine will return with the input value carried in string variable IN$ which can then be transferred to whatever numeric variable you wish, using the VAL(IN$) command.

For example, if your numeric variable is X then you would write X = VAL(IN$). In this way, both single and double precision input can be handled by the same subroutine.

How It Works

The actual subroutine begins at line 50000 in Listing 1. For a quick demonstration of how it works, simply tack on the short program stub given in Listing 1. This will give you an accumulating calculator on the computer screen.

Note that the subroutine will accept entry of the minus sign only if it is the first thing entered. Attempts to enter the minus sign at any other time will be ignored, as will any effort to make a non-numeric entry. The only exception to this rule is the letter C, which will clear the routine and return the display to zero so you can start over.

In actual use, the subroutine works this way. Let's say that at line 1000 you wish to enter a dollar amount into variable A. Normally, you might write something like

```
1000 INPUT"ENTER A DOLLAR AMOUNT";A
```

and enter the desired dollar amount, including the decimal point. However, if you are entering amounts in columns, and your entries have varying numbers of digits, you will find that the columns don't line up neatly. Our subroutine solves the problem this way:

```
1000 PRINT"ENTER A DOLLAR AMOUNT";:
FL = 6:GOSUB 50000:A = VAL(IN$)
```

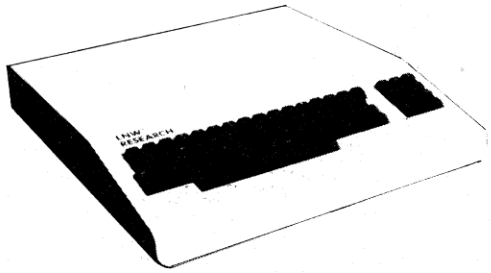
Your display would look this way if you entered 123456:

Program Listing 1

```
50000 '----------->> INPUT USING ROUTINE <<----------
50005 FL=FL+2
50010 T%=((FL-6)/3):PRINTSTRING$(T%+2," ");
50015 T%=0
50020 A$="":IN$="":IL$="":IS$=" "
50025 PRINTSTRING$(T%+FL-5," ");
50030 PRINT"$0.00";
50035 C!=0:T=0:I=0
50040 REM
50045 A$=INKEY$:IF A$="" THEN 50045
50050 IF A$<>"C" THEN 50065
50055 GOSUB 50150 '--ADJ FOR COMMAS
50060 PRINTSTRING$(FL+1+T%,24);STRING$(FL+1+T%," ");STR
      ING$(FL+T%,24);:GOTO50020
50065 IF ASC(A$)<>13 THEN 50085
50070 IF C!>2 THEN IN$=LEFT$(IN$,LEN(IN$)-2)+"."+RIGHT$
      (IN$,2) ELSE IF C!=2 THEN IN$="."+IN$ ELSE IF C!=1
      THEN IN$=".0"+IN$ ELSE IN$="0"
50075 IF IS$="-" THEN IN$=IS$+IN$
50080 IF FF<>10 THEN PRINT
50082 FF=0:RETURN
50085 IF C!>=FL-2 THEN 50045
50086 IF C!<>0 THEN 50095
50090 IF A$="-" THEN IS$="-":PRINT STRING$(6,24);IS$;"$
      0.00";:GOTO50040
50093 IF A$="0" THEN A$="":GOTO50040
50095 IF A$<"0" OR A$>"9" THEN 50045
50100 IN$=IN$+A$
50105 GOSUB 50150
```

Program continues

4MHZ, DOUBLE DENSITY, COLOR & B/W GRAPHICS . . THE LNW80 COMPUTER



When you've compared the features of an LNW80 Computer, you'll quickly understand why the LNW80 is the ultimate TRS80 software compatible system. LNW RESEARCH offers the most complete microcomputer system at an outstanding low price.
We back up our product with an unconventional 6 month warranty and a 10 days full refund policy, less shipping charges.

LNW80 Computer $1,200.00
LNW80 Computer w/B&W Monitor & one 5" Drive $1,664.00
All orders must be prepaid, CA residents please include 6% sales tax.
Shipping and handling charge of $15.00 must be included with every order.
* TRS80 Product of Tandy Corporation.
** PMC Product of Personal Microcomputer, Inc.

COMPARE THE FEATURES AND PERFORMANCE

FEATURES	LNW80	PMC-80**	TRS-80* MODEL III
PROCESSOR	4.0 MHZ	1,8 MHZ	2.0 MHZ
LEVEL II BASIC INTERP.	YES	YES	LEVEL III BASIC
TRS80 MODEL 1 LEVEL II COMPATIBLE	YES	YES	NO
48K BYTES RAM	YES	YES	YES
CASSETTE BAUD RATE	500/1000	500	500/1500
FLOPPY DISK CONTROLLER	SINGLE/ DOUBLE	SINGLE	SINGLE/ DOUBLE
SERIAL RS232 PORT	YES	YES	YES
PRINTER PORT	YES	YES	YES
REAL TIME CLOCK	YES	YES	YES
24 X 80 CHARACTERS	YES	NO	NO
VIDEO MONITOR	YES	YES	YES
UPPER AND LOWER CASE	YES	OPTIONAL	YES
REVERSE VIDEO	YES	NO	NO
KEYBOARD	63 KEY	53 KEY	53 KEY
NUMERIC KEY PAD	YES	NO	YES
B/W GRAPHICS, 128 X 48	YES	YES	YES
HI-RESOLUTION B/W GRAPHICS, 480 X 192	YES	NO	NO
HI-RESOLUTION COLOR GRAPHICS (NTSC), 128 X 192 IN 8 COLORS	YES	NO	NO
HI-RESOLUTION COLOR GRAPHICS (RGB), 384 X 192 IN 8 COLORS	OPTIONAL	NO	NO
WARRANTY	6 MONTHS	90 DAYS	90 DAYS
TOTAL SYSTEM PRICE	$1,664.00	$1,840.00	$2,187.00
LESS MONITOR AND DISK DRIVE	$1,200.00	$1,375.00	---

LNW80

- BARE PRINTED CIRCUIT BOARD & MANUAL $89.95

The LNW80 - A high-speed color computer totally compatible with the TRS-80*. The LNW80 gives you the edge in satisfying your computation needs in business, scientific and personal computation. With performance of 4 MHz, Z80A CPU, you'll achieve performance of over twice the processing speed of a TRS-80*. This means you'll get the performance that is comparable to the most expensive microcomputer with the compatibility to the world's most popular computer (TRS-80*) resulting in the widest software base.

FEATURES:
- TRS-80 Model 1 Level II Software Compatible
- High Resolution Graphics
  - RGB Output - 384 x 192 in 8 Colors
  - NTSC Video or RF MOD - 128 x 192 in 8 Colors
  - Black and White - 480 x 192
- 4 MHz CPU
- 500/1000 Baud Cassette
- Upper and Lower Case
- 16K Bytes RAM, 12K Bytes ROM
- Solder Masked and Silkscreened

LNW SYSTEM EXPANSION

- BARE PRINTED CIRCUIT BOARD AND MANUAL $69.95
- WITH GOLD CONNECTORS $84.95

The System Expansion will allow you to expand your LNW80, TRS-80*, or PMC-80** to a complete computer system that is still totally software compatible with the TRS-80* Model 1 Level II.

FEATURES:
- 32K Bytes Memory
- 5" Floppy Controller
- Serial RS232 20ma I/O
- Parallel Printer
- Real Time Clock
- Screen Printer Bus
- On Board Power Supply
- Solder Masked and Silkscreened

KEYBOARD

LNW80 KEYBOARD KIT $84.95

The Keyboard Kit contains a 63 key plus a 10 key, P.C. board, and remaining components.

LNDoubler + DOS Plus 3.2D

- Assembled and Tested $175.00

Double-density disk storage for the LNW Research's "System Expansion" or the Tandy's "Expansion Interface". The LNDoubler™ is totally software compatible with any double density software generated for the Percom's Doubler***. The LNDoubler™ provides the following outstanding features.

- Store up to 350K bytes on a single 5" disk
- Single and double density data separation
- Precision write precompensation circuit
- Software switch between single and double density
- Hardware override into single density only
- Easy plug in installation requiring no etch cuts, jumpers or soldering
- 35, 40, 77, 80 track 5" disk operation
- 120 day parts and labor Warranty

*** Doubler is a product of Percom Data Company, Inc.

DOS PLUS 3.2D

Micro Systems software's double density disk operating system. This operating system contains all the outstanding features of a well developed DOS, with ease in useability.

LNW DATA SEPERATOR

- Assembled and Tested $17.95

The LNW Data Separator provides you with a reliable and inexpensive means of solving your disk data read error problems for your 5" single density drives. Compatible with both the LNW System Expansion and Tandy's Expansion Interface. Some soldering is required.

CASE

LNW80 CASE . Add $12.00 for postage $84.95

The streamline design of this metal case will house the LNW80, LWN System Expansion, LNW80 Keyboard, power supply and fan, LNDoubler™, or LNW Data Separator. This kit includes all the hardware to mount all of the above.

PARTS AVAILABLE FROM LNW RESERARCH
4116 - 200ns RAM
- 6 chip set $26.00
- 8 chip set $33.50
- 16 chip set $64.00
- 24 chip set $94.00
- 32 chip set $124.00

- LNW80 "Start up parts set" LNW80-1 . . . . . $82.00
- LNW80 "Video parts set" LNW80-2 . . . . . $31.00
- LNW80 Transformer LNW80-3 . . . . . $18.00
- LNW80 Keyboard cable LNW80-4 . . . . . $16.00
- 40 Pin computer to expansion cable $15.00
- System Expansion Transformer $19.00
- Floppy Controller (FD1771) and UART (TR1602) . . . $30.00

LNW RESEARCH ✓53
CORPORATION
14661-C MYFORD RD.
TUSTIN CA. 92680

VISA & MASTER CHARGE ACCEPTED, Add $3 for postage
ORDERS & INFO. NO. 714-552-8946
SERVICE NO. 714-641-8850

✓See List of Advertisers on page 306

A MAJOR BREAKTHRU FOR

TRS 80™*

Electronic Engineers
Electronic Hobbiest
Electronic Students
Ham Operators

A General DC-AC (steady state) Analysis of Any Circuit

Will Analyze and Compute:

- Node, Branch, Element, Voltages
- Node, Branch, Element, Currents
- Branch Power Dissipation
- Magnitude and phase values and complete frequency response with graphic display
- Modify any element in circuit for desired results

A complete operational manual supplied comparable to I.B.M.'s E.C.A.P.™ Program
*A.C. Analysis Program *$149.95*
*D.C. Analysis Program *$89.95*
*Order before May 31, 1981 to get both for *$149.95*

To Order Write:
G & L Software Enterp.
2304 N. 1st. Street
Upland, CA 91786

60 DAY MONEY BACK GUARANTEE IF NOT SATISFIED.

VISA master charge

Do Not Send Cash in the Mail

TRS 80™ is a trademark of the Tandy Corp.. E.C.A.P. is a trademark of International Business Machines, Inc. ✓39

TRS-80™

MODEL III AND MODEL I SOFTWARE PACKAGES.

Can 30 user proven high-quality TRS-80 programs cost a mere $24.95?

We have a lot to gain by almost losing our shirts. Because we're a young, growing software company. We're BASICS AND BEYOND. And in order to build, we need your business.

MICROCOSM I. Thirty programs with everything from our incredible "Atlantis" game that'll challenge your intellect, to "Flowering Houseplants" for valuable reference.

MICROCOSM II. Twenty programs that require skill: the desire for intense concentration as in "Decipher". And practical guides like "Stain Removal."

Both packages, for 16K Model I or Model III, on quality tape cassettes, with hardcover storage case and detailed handbook, just $24.95 each. Our prices will never be lower. Send today.

BOX 10 • AMAWALK, N.Y. 10501 (914) 962-2355

BASICS & BEYOND, inc.

No charge for postage or handling. N.Y. residents add 5% sales tax. TRS-80 is a trademark of Radio Shack Division of Tandy Corp. ✓49

$0.00	Initial display
$0.01	First digit entered
$0.12	Second digit entered
$1.23	Third digit entered
$12.34	Fourth digit entered
$123.45	Fifth digit entered
$1,234.56	Sixth digit entered

The routine is an INPUT equivalent to PRINT USING.

I have used this routine for all of my business software and have found it to be fast, convenient and reliable. ■

```
50110 PRINTSTRING$(FL+1+T%,24);
50115 C!=C!+1
50120 IF C!>8 THEN IL$=LEFT$(IN$,LEN(IN$)-8)+","+MID$(I
      N$,LEN(IN$)-7,3)+","+RIGHT$(IN$,5) ELSE IF C!>5 TH
      EN IL$=LEFT$(IN$,LEN(IN$)-5)+","+RIGHT$(IN$,5) ELS
      E IL$=IN$
50125 IF C!>2PRINTSTRING$(((FL-5)-(C!-3))," ");:PRINT I
      S$;"$";LEFT$(IL$,LEN(IL$)-2);".";RIGHT$(IL$,2);:GO
      TO50140
50130 IF C!=1 THEN PRINTSTRING$(FL-5," ");IS$;"$0.0";IL
      $;
50135 IF C!=2 THEN PRINTSTRING$(FL-5," ");IS$;"$0.";IL$
      ;
50140 GOTO50040
50145 STOP
50150 T%=((LEN(IN$)-3)/3):IF T%<1 THEN T%=0: '--COMMA A
      DJ
50155 RETURN
```

Program Listing 2

```
>50000
>LIST
1  REM FORMATTED INPUT PROGRAM DEMONSTRATION DRIVER
2  REM ACCUMULATING CALCULATOR
3 REM DEMONSTRATION IS IN DOUBLE PRECISION BUT THE
SUBROUTINE AT 50000 WILL ALSO WORK IN SINGLE PRECISION
4  REM DEMONSTRATION IS A TYPICAL APPLICATION
10  CLS
20  PRINT TAB(15)"FORMATTED INPUT DEMONSTRATION"
30  CLEAR 100
40  DEFINT A-Z
50  PRINT"ENTER AN AMOUNT "::FF=10:FL=9:GOSUB 50000
60  T#=T#+VAL(IN$) :PRINT USING "$$#######,,.##";T#
70  GOTO 50
```

Explanations of Program Listing 1.

```
49999 LIST
50000 ========>>INPUT USING---HOW IT WORKS<<==========
50005 ADD 1 SPACE FOR $ SIGN, 1 SPACE FOR DECIMAL POINT
50010 T% REPRESENTS MAX # OF COMMAS
50015 CLEAR T% (AFTER THIS T% WILL REPRESENT ACTUAL # O
      F COMMAS)
50020 CLEAR STRING VARIABLES
50025 MOVE CURSOR TO BEGINNING POINT
50030 INITIAL DISPLAY (DOLLAR SIGN, ZERO, DECIMAL, AND
      TWO MORE ZEROES)
50035 IITIALIZE NUMERIC VARIABLES
50040 ENTRY POINT
50045 INKEY$ INPUT
50050 CHECK IF INKEY$ INPUT IS A  "C" --IF NOT JUMP TO
      50065
50055 PUT INTO T%, THE ACTUAL NUMBER OF COMMAS NEEDED F
      OR DISPLAY
50060 ERASE DISPLAY, RESTORE CURSOR, JUMP TO START OF E
      NTRY ROUTINE AT 50020
50065 CHECK IF CARRIAGE RETURN--A$=CHR$(13) IF NOT JUMP
       TO 50085
50070 FINAL OUTPUT ROUTINE--ESTABLISH PROPER DECIMAL PL
      ACEMENT
50075 INSERT MINUS SIGN IF NEEDED IN VARIABLE IN$
50080 DETERMINE IF SCREEN DISPLAY SHOULD BE INCREMENTE
50082 END OF FINAL OUTPUT ROUTINE----RESET SCREEN INCRE
      MENT FLAG 'FF' TO ZERO AND EXIT
50085 PREVENTS EXTNDING ENTRY BEYOND LIMIT SPECIFIED BY
      FL
50086 IGNORE NEXT TWO LINES IF COUNTER IS GREATER THAN
      ZERO
50090 ACQUIRE MINUS SIGN ONLY IF ENTERED BEFORE ANYTHIN
      G ELSE
50095 REJECT NON-NUMERIC ENTRY
50100 APPEND LAST ENTRY TO MAIN STORAGE STRING--IN$
50105 COMMA ADJUST
50110 MOVE CURSOR TO PROPER POSITION FOR DISPLAY STRING
      --IL$
50115 INCREMENT COUNTER
50120 CONFIGURE DISPLAY STRING--IL$--WITH PROPER # OF C
      OMMAS
50125 TO 50135 DISPLAY VALUE WITH PROPER DECIMAL LOCATI
      ON
50140 JUMP BACK TO INPUT POINT
50145 SAFETY STOP
50150 SUB TO DETERMINE PROPER # OF COMMAS IN CURRENT DI
      SPLAY
```

Your computer benefits from an interpreter, so why not you?

Foreign Language Translation

Dan L. Robinson
1625 Higgins Way
Pacifica, CA 94044

Can the Electric Pencil and the TRS-80 team up to translate foreign languages? They sure can!

If you must decipher a business letter from a client across the sea, research a technical paper to see how companies overseas have advanced, learn a language, or merely communicate with Grossmutter from the old country, then TRS-80 and Pencil can do it.

What makes Pencil into a foreign language translator is its string search and replacement mode. Simply type in: (space) FOREIGN WORD (space)/(space) ENGLISH WORD(space)/999 and presto! That word is changed to another language throughout the text. This means it is necessary to look up a foreign word only once.

Since most applications may be confined to a narrow field (you may be in the widget exporting business; your specialty may be laser brain surgery), a small vocabulary will probably suffice, adding only a few new words for each future translation.

Like everything else, there's a right and a wrong way to translate with Electric Pencil, and believe me, I've tried all the wrong ways.

Inputting Text

When typing in the original text, *don't* use Pencil's lowercase option. The search and replace mode won't recognize *The, the,* and *THE* as the same word, and you may have to replace the string three times unless you stick to uppercase. You can convert to lowercase later, if you wish, as you replace the foreign words with English.

Using uppercase avoids another confusing element; some languages don't follow the same conventions on capitalization that we do. For example, the Germans capitalize such words as Log, Distance and Poor Fool, even in the middle of a sentence. You might find that the important looking name with the capital letter translates to "Stuffy air" in English.

Be particularly careful with Pencil's famous dropped letters in the first word on a new line. The string search won't recognize a word with a missing letter, and probably later on neither will you.

Leave a space between words and puctuation marks. The string search won't recognize (space) WORD(space) as being the same as "WORD or WORD;.

If the foreign alphabet contains symbols not used in English, you may substitute @$% * + =, so long as you are consistent.

Make liberal use of markers such as ((((((PAGE 3)))))) so that you can easily find your place, or recognize your remarks as distinct from the text.

Building a Dictionary

If you are going to translate often, it's important to build a dictionary so you won't have to look up words more than once. As small as your widget-exporting or laser-brain-surgery vocabulary may be, it's easier if it is in alphabetical order, and being able to consult the foreign dictionary in alphabetical order is much quicker than leaping from A to Z and back to the same page.

The following program will permit you to input the foreign words at random. It will then present them in alphabetical order so that you may tack on their English counterparts. Add a routine at the end to save the data to a disk or tape file, and you'll be ready to use them again in the future:

```
10 CLS:PRINT"DICTIONARY":CLEAR
   1500 ; DIM A$(100)
20 PRINT:INPUT"NUMBER OF WORDS";
   C
30 FOR D = 1 TO C:PRINT"WORD";D;:
   INPUT A$(D):NEXT D
40 FOR D = 1 TO C:FOR E = 1 TO C - 1
50 A$ = A$(E):B$ = A$(E + 1):IF A$©B$
   THEN 70
60 A$(E) = B$:A$(E + 1) = A$
70 NEXT E,D:CLS
80 FOR D = 1 TO C:PRINT A$(D);" = ";:
   INPUT Z$
90 A$(D) = A$(D) + " = " + Z$:NEXT D
100 END
```

Making the Translation

Most languages, like our own, make larger words out of a number of smaller ones, and the meaning may have little relation to the elements. Therefore, it is important to first translate *words* and not *word elements*. For instance, changing short words might give an equivalent of "a mixture of nitrogen and oxygen" and "a tool for shaving wood" when what was meant was "airplane".

To avoid this pitfall, the string to be searched and its replacement should be placed between a pair of spaces. That way, only words and not word elements will be translated; and that is also why you input the text with a space between the words and the punctuation marks.

Making the replacement, you may now choose to have the English translation in lowercase.

In Pencil's string search mode, # is the wild card, and it can save a great deal of effort. Languages such as French, Spanish and Italian use slightly different words depending on whether the word is masculine or femine, although both would

translate the same into English. Thus LOS and LAS in Spanish would both translate into THE in English using the # symbol: (space)L#S(space)/(space)THE(space)/999.

Many words have more than one meaning, and only when viewed in context is it possible to select the correct one. These words can be saved until the more obvious words have been replaced. There are two ways to deal with these multiple meaning words.

The first is a blunderbuss approach, throwing in some bell-ringing markers to get your attention as you later review the text: (space)FOREIGN WORD (space)/(space)$$$ENGLISH WORD$$$(space).

As you come across $$$ WORD$$$ in the text, you can decide if you have selected the proper meaning, and the markers can be removed once you are satisfied.

The second method is to use the search function without a replacement. Pencil will put the cursor at the beginning of the line containing the string, and you may then type in the appropriate translation. Merely type C to continue the search to the next string location.

After all the major words have been changed, it's time to deal with those tricky word elements.

In English, the first or last few letters often modify a word and give its true meaning. For example, the UN in UNable. Dealing with prefixes and suffixes is just a matter of spacing:

```
(space)FOREIGN PREFIX / (space)
  ENGLISH PREFIX / 999
FOREIGN SUFFIX(space) / ENGLISH SUFFIX
  (space) / 999
FOREIGN ELEMENT / ENGLISH ELEMENT/
  999
```

Translating parts of words can be hazardous, since the actual meaning isn't always the same as the literal translation. That's why word elements should be changed only after whole words have been translated.

There will probably be a few words for which you have been unable to find an English counterpart in your $1.95 paperback dictionary. By this time, you may have translated enough so that the meaning of these mystery words is made clear by the context. If not, insert * as a marker. You can use the string search to locate the tough words so that they can be listed for a later trip to the library's foreign language dictionary.

Page 1 of your first translating effort is a task, since you'll have to look up every word. As your mini-dictionary is built up, you'll discover how easy it is to use the TRS-80 and Electric Pencil to change confounding foreign letters and articles into English.■

VISA/MC Order Line Only (except Mich.) 800-253-4358 ext. 100

FINDISK-II The ultimate in automatic disk indexing with exclusive features ..... Model-I $20.00
AUTOMATICALLY create INDEX of programs or data from all your disks, print disk LABELS, print alphabetized MASTERLIST, do fast SEARCH, add DESCRIPTIONS. Also automatically: detect DATA or SYS disks, PURGE disks and index of old files, and UPDATE from revised disks only.

SOLAR-I The critical calculations for passive design... Model-I $30.00 ..... Model-II $45.00
INPUT: any latitude, orientation, slope, roof overhang, storage type, building loss, OUTPUT: solar angles, shading, time, heat gain/loss, percent solar, fuel use. Print report by hour, month, year in presentation format.

RIA-II Complex Real Estate Investment Analysis ..... Model-I $30.00.....Model-II $45.00
Analysis for investor or homeowner using Elwood method. INPUT: Project costs, loan and tax data, expenses, depreciation rate. OUTPUT: Cap rate/value, mortgage payments, before/after tax cash flows, return (IRR), profit/gain from sale over any time series.

DEPRECIATE-I Manage a list of depreciable items ..... Model-I $15.00.....Model-II $20.00
Tracks long list of depreciable items with varying purchase dates, depreciation rates, or per cent business use. Update any time. Print tax form. Used by many CPAs.

STRUCT-I Graphic design of steel/wood beams and moment transfer..... Model-I $15.00
INPUT: span/cantilever, uniform/point loads, beam material. OUTPUT: with screen graphics beam moment & shear diagrams. Print job report with diagram, stresses, and required beam sizes.

Min 32K. On disk (Mod-I one drive order tape). Add $1.00 postage (Mich. add 4% tax) VISA/MC

✓88 **DOCUMAN SOFTWARE BOX 387-A KALAMAZOO, MI 49005 (616) 344-0805**

80 Program Watch!

Converted any 80 programs lately?

80 is looking for updates to its published programs. Have you converted a program to run on a Model I? Model II? Model III? The Color Computer or the Pocket Computer?

Do your neighbors a favor and make yourself some extra

CA$H

Send them to the office in care of:
Jake Commander
80 Pine Street Peterborough, NH 03458

RSGLMOD1 - $50 - Enhancements to Radio Shack General Ledger 1.1 Special feature - Copy ONLY ONE disk for back-up security.

Print features - General ledger with beginning balances; current month activity; ending balances ** Classified balance sheet.

Print Options - Omit current column on income statement ** Omit account numbers on balance sheet and/or income statement.

Input Display - Previous document name, number of entries/total entries permitted for current session, and dollar total of current document are always visible. These are nice anytime and just plain excellent after you return from an interruption.

Input Options - Set up an "automatic" account number. Touch ENTER to use. Change to another account anytime ** Re-do a document after it is balanced (Before starting next document) ** Change document name and entry date for each entry. One possibility is a check register with only one cash entry ** Automatic credits to liability, capital, and income accounts ** Others.

Supplied as program lines which must be MERGED into the original programs, or, send a disk copy of the original programs and the modifications will be installed on your diskette — no additional charge.

DDIR81 - $23 - Organize your disks. Creates program lines of directory contents using TRSDOS or NEWDOS. 32K/one drive.

CAT - $12 - You have to plan ahead to beat the computer or a friend. X's and O's advance with each human move. Fast graphics.

FTDEMO80 - $12 - Displays and EXECUTES the NEWDOS/80 Appendix A programs and keyboard entries. A real time saver. 32K. Disk only. Deduct $3 each for 2nd-3rd-4th program. Add 4% for MasterCard/Visa

NEWDOS/80 - $135 DOUBLER - $215 DOUBLE-ZAP II - $47 DOUBLE-ZAP (2.1)- $37 BASE 2 MODEL 850 - $760 w/Cable
MODEL III DISK DRIVES FIRST - $760 SECOND - $350 EXTERNAL - $430

✓445 **AT-80 3827 Dismount Dallas, Texas 75211 (214) 339-0498**

SUPER DISCOUNTS ON ALL COMPUTER EQUIPMENT

16K MEMORY ..... ONLY $25.95!
For **TRS-80** Keyboard or Expansion interface. KEYBOARD requires jumpers: $2.00 Extra. These are 200 ns tested RAM for the **TRS-80, APPLE** or **EXIDY.**

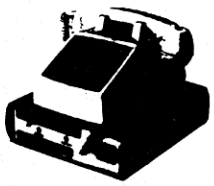
DISK DRIVES for the TRS-80 OR PMC-80:

All of our drives come complete with power supply and chassis. They may be used with existing Radio Shack drives on the same cable! 40 track drives store 102K bytes single density, and 175K double density. 80 track drives have 175K single density and 345K double density! All drives guaranteed 90 days, one year on power supply.

40 track MPI drives **$319.95**
40 track TEAC drives **$315.95**
40 track TANDON drives **$319.95**
80 track MPI drives **$449.95**
80 track TEAC drives **$429.95**
2 drive cable ..... **$ 25.95**
4 drive cable ..... **$ 39.95**
NEWDOS 80 OPERATING SYSTEM **$139.95**
NEWDOS 80 PATCH Patches **NEWDOS 80** to work with single or double density and the doubler..... **$ 59.95**
PERCOM'S DOUBLER for double density operation! **$219.95**
The **DOUBLER** works with the **TRS** or **PMC** expansion interfaces to allow you to use your drives in double density! You may still operate your drives as single density also! Comes with **DBLDOS** operating system which allows you to transfer single density files to double and vice versa! *GREAT BUY!*
DISKETTES: VERBATIM DATALIFE! *BOX OF TEN* SOFT OR HARD SECTORED 5¼' **$32.50**

WE HAVE DRIVES AND CONTROLLERS FOR THE MODEL III. CALL FOR PRICES!!!

MODEMS AND TELE-COMMUNICATIONS



LYNX Telecommunication system for the TRS-80 and PMC-80 ..... **$279.95**
Includes terminal software and connections for instant hookup! Can be connected to the **TRS-80** or **PMC-80** with or without an expansion interface!

LEXICOM MODEM 300 BAUD Requires RS-232 ..... **$169.95**
THE SOURCE: Hook-up to the "SOURCE" ..... **$ 99.95**
ATARICONNECTION: Modem for 400/800, complete with software! **$249.00**
APPLECONNECTION: Modem for APPLE II **$279.95**

COMPLETE SYSTEMS:

PMC-80, 16K LEVEL II COMPUTER **$739.00**
The **PMC-80** is a work alike to the **TRS-80** mod I computer! Comes with Microsoft's **BASIC** in ROM. Built in cassette. 12" green screen video monitor. Expandable to 48K.
Compatible to All **TRS-80 MOD I Programs.**
PMC 80 without monitor **$595.00**
RF—MOD for PMC to TV hookup **$39.95**
PMC-80 EXPANDER 100 SYSTEM **$644.00**
INCLUDES: 32K memory, S-100 bus, RS-232 interface, Parallel printer driver, Disk controller. Fully compatable with **TRSDOS, NEWDOS, VTOS,** and all other **TRS-80 Mod I disk software!**
APPLE II COMPUTERS 16K **$1195.00**
APPLE II COMPUTERS 48K **$1299.00**
ATARI 400 ..... **$ 495.95**
ATARI 800 COMPUTER ..... **$ 795.00**
ZENITH Z-89 48K, 1 DISK ALL IN ONE COMPUTER **$2495.00**

VIDEO MONITORS

LEEDEX 100 12' B/W MONITOR **$139.95**
SANYO 9' B/W MONITOR **$199.95**

PRINTERS

OKIDATA MICROLINE 80 All OKI'S have TRS-80 Graphics!!! ..... **$ 499.00**
Comes with friction and pin feed. upper/lower case, Graphics.
EPSON MX-80 PRINTER: Word Processing Quality Printout with Graphics! ..... **Call**
NEC SPINWRITER with Tractor Feed ... **$2995.00**
DIABLO MODEL 1630 with Tractor **$2695.00**
UNIVERSAL PRINTER STANDS ..... **$ 94.50**

Other Accessories:
SUP-R-MOD RF Modulator for APPLE ... **$29.95**
ARCHBOLD SPEED-UP MOD FOR TRS MOD I. Allows up to 300% increase! **$45.00**
MICROSOFT BASIC Decoded and other mysteries **$29.95**
TRS-80 DISK and other mysteries **$18.95**
ZBASIC BASIC COMPILER for MOD I and MOD III TRS-80 and PMC-80 Increase basic program speeds by up to 200 times!!!!!
Tape ..... **$79.95 Disk** **$89.95**

Both For Only $99.95 Specify MOD I or MOD III

WE HAVE HUNDREDS OF PROGRAMS FOR ALL THE POPULAR COMPUTERS! CALL FOR OUR FREE CATALOG

Personal and Business Checks take 3 weeks to clear. For fastest delivery use Certified Checks, Money Orders, Credit Card, or C.O.D.

We will try and beat any published price on any system! Call!

SIMUTEK COMPUTER PRODUCTS ™ ✓19

4877 E. Speedway Blvd.
Tucson, Arizona 85712
(602) 323-9391: Technical Questions

CALL TOLL FREE TO ORDER
(800) 528-1149
Please mention this magazine when ordering.
ARIZONA RESIDENTS ADD 6% SALES TAX.
WE TAKE VISA, MASTER CARD.

TRS-80 IS A TRADEMARK OF RADIO SHACK, A TANDY CORP APPLE IS A TRADEMARK OF APPLE, INC

✓See List of Advertisers on page 306

A cassette based, double entry accounting system for the small business.

The General Ledger

R. L. Conhaim
15506 Kiamichi Rd #1
Apple Valley, CA 92307

One of the most practical applications of the microcomputer is the keeping of the financial records for small to medium-size businesses.

Among important records is the general ledger for which many packaged programs are available.

Unfortunately for the owner of a very small business, they are often too complex. Also, there is often a sizeable investment required for the hardware and software. Just keeping such small programs up to date may also require too much time. The small business, therefore, needs only those records which pare it down to provide tax information; secure loans; make mandatory reports, and provide the owners with information about the status of the business. Anything more is overkill.

Many general ledger programs available require disk memory, at least 32K of RAM, and a considerable amount of time to keep the records current. In addition, there are single entry bookkeeping systems that become unusable when the business grows large enough to need double entry accounting.

No.	Account Name	Primary Variable	Secondary Variable	Location	Type
1	Petty Cash	A1		1580	A
2	Cash in Bank	A2		1600	A
3	Savings Account	A3		1620	A
4	Parts Inventory	A4		1640	A
5	Merchandise Inventory	A5		1660	A
6	Accounts Receivable	A6		1680	A
7	Furniture & Fixtures	A7		1700	A
8	Service Equipment	A8		1720	A
9	Trucks & Autos	A9		1740	A
10	Building	B1		1760	A
11	Keogh Account	B2		1780	A
12	Miscellaneous Fixed Assets	B3		1800	A
13	FICA Withheld	L1		1820	L
14	Employees' Taxes Withheld	L2		1840	L
15	Accounts Payable	L3		1860	L
16	Notes Payable	L4		1880	L
17	Sales Tax Due	L5		1900	L
18	Mortgage Payable	L6		1920	L
19	Keogh, Employees' Contrib.	L7		1940	L
20	Jenkins Capital	L8		1960	L
21	Sales, Service Labor	I1	J1	1980	I
22	Sales, Service Parts	I2	J2	2000	I
23	Sales, Merchandise	I3	J3	2020	I
24	Interest Earned	I4	J4	2040	I
25	Miscellaneous Income	I5	J5	2060	I
26	Purchases, Parts	E1	K1	2080	E
27	Purchases, Merchandise	E2	K2	2100	E
28	Cost of Goods Sold	E3	K3	2120	E
29	Payroll	E4	K4	2140	E
30	FICA Expense	E5	K5	2160	E
31	Auto & Truck Expense	E6	K6	2180	E
32	Bad Debts	E7	K7	2200	E
33	Telephone Expense	E8	K8	2220	E
34	Postage	E9	K9	2240	E
35	Interest Paid	F1	M1	2260	E
36	Dues & Subscriptions	F2	M2	2280	E
37	Insurance	F3	M3	2300	E
38	Depreciation	F4	M4	2320	E
39	Maintenance, Building	F5	M5	2340	E
40	Utilities,Gas, Elec.,Water	F6	M6	2360	E
41	Office Expense	F7	M7	2380	E
42	Service Equipment Maintenance	F8	M8	2400	E
43	Personal Property Tax	F9	M9	2420	E
44	Workmen's Compensation	G1	N1	2440	E
45	Shipping Expense	G2	N2	2460	E
46	Service Expense	G3	N3	2480	E
47	Miscellaneous Expense	G4	N4	2500	E
48	Jenkins Withdrawals	H1	N5	2520	-
49	Profit & Loss	H2	N6	2540	-

Sample 1. Jenkins List of Accounts

The system described can provide the small business with a practical double entry general ledger (TRS-80, Level II, 16K system). It uses the standard cassette and a peripheral printer. Data is kept on cassette so there is no practical limit to the number of entries but a limit to the number of accounts, 65 being practical.

A common sense rule is—if you only use an account occasionally, you probably don't need it. Extras may be lumped into a miscellaneous category.

The most common form of bookkeeping is called double entry. For every transaction, two or more entries are made. These entries are either positive or debit, or negative credit. For every transaction, the debits must equal the credits. Assets and expenses normally have debit balances, while liability, income, and capital accounts have credit balances. Accounts are identified by name and number.

Daily entries are normally made in a journal, of which there are several styles, while account totals are accumulated in a ledger. The general ledger is the principal source of information. Subsidiary ledgers can handle accounts receivable and accounts payable. These divide totals from the general ledger into customer and supplier names and amounts.

In a double entry system, the amounts between debits and credits must correspond and balance; if they don't, a mistake has been made. Checking the balance is called trial balancing in which all ledger accounts are added, the debits in one column and the credits in another. The totals of each must then match. The columns may be added together algebraically, looking for zero balance.

The advantage of double entry is its ability to point out errors quickly, and distribute amounts to accounts efficiently. Of course, since everything is written twice, the chance for making errors is there, but it may be minimized with a well-designed computer system.

The system here has been developing for three years, and was begun on a programmable TI-59 calculator and later adapted to the TRS-80. This provided more account memory with greater flexibility.

It has been through the throws of correction, adaptation, modification and expansion to the point where it satisfies several types of businesses. Two features include: a manually-maintained general ledger which can be updated whenever convenient. The journal serves as a check register, since many businesses receive income and make dispersals by check.

The system may be used with cash or accrual bookkeeping. The accrual method is a necessity for income tax purposes, where merchandise inventories are maintained. In this method, sales are considered made when the merchandise or service is delivered, and purchases or expenses are accrued when the purchased items are received.

The Journal

The journal in this system has a number of columns. There are three for cash—debit, credit and balance. The balance is maintained manually as a check on the computer balance's accuracy. It is one of many checks to insure that information is correctly entered. Most of the other columns are single-columns in which distributions of transactions are made. The accounts most often used have individual columns. A three-column catch-all, labeled account number, debit and credit takes care of less often used accounts.

To make inputting to the computer faster, a worksheet is used. It takes its data from the journal and lists the account numbers and amounts for debits, and account numbers and amounts for credits for each transaction. The sheet may seem unnecessary and increase the error possibilities, but working at the computer with a large, clumsy journal is indeed difficult. The use of a worksheet avoids errors.

The Computer

The computer part of the system uses three cassettes: one contains the program; a second, contains monthly data (and is used over and over, month after month), a third, accumulates year-to-date data

The operator enters the date, and indicates as to whether the data is monthly or accumulated annually. A menu then appears on the screen providing a choice of the following: making entries, running a trial balance, printing a profit and loss statement or a balance sheet, and performing the end of month procedure. The last choice provides a means of adding the monthly data to the annual accumulated data. When the end of the month's procedure is completed, the monthly data tape retains only the assets and liabilities accounts. Expense and income accounts have been zeroed so the tape is ready for the new month. The year-to-date tape retains all data for accounts cumulatively for the year.

The Workings of the System

The workings of this system are best illustrated by us creating a hypothetical business and setting up accounts for it. We'll call our business the Jenkins Service Company. It is a single proprietor establishment owned by George Jenkins. The business of the company is repairing and selling TV and radio sets. The repair business is the largest part of the company. Jenkins employs three people and owns two service trucks. There are 49 accounts in this business, but these are not necessarily typical of other businesses, nor are the amounts used.

The account breakdown in as follows: six current asset accounts, six fixed asset accounts, five current liability accounts, two fixed liability accounts, one capital (net worth) account, five income accounts, one cost of goods sold account, two purchases accounts and 21 expense accounts.

Any business may use the program—changing only the names of the accounts, along with making a few minor program changes, if needed. As we shall see, accounts may be added, for a total of perhaps 65.

A Closer Look

The program is fully interactive with the operator, providing instructions throughout for making entries and securing various reports. The program takes about 10K. (Note in line 30 we are using double precision for the various dollar amounts.) Early in the development of this program, we discovered that a combination of double precision and two decimal place print using statements got rid of those one-cent errors plaguing bookkeeping programs. Lines 60 and 70 define the print using formats.

When the entries portion of the program are selected, the screen asks for account number, amount, and whether the amount is a credit. The operator presses ENTER if the amount is a debit, but must enter C if it is a credit amount. If the amount is the same as a previous entry just hit ENTER in answer to the enter amount input. The previous entry is saved by the program in lines 260 through 290. This avoids possible errors which could be caused by re-entry of the same amount. In many transactions, there is only one debit and one credit account and the amount is the same for each.

Entries are printed out, and in case of an entry error, traced easily. Line 330 accumulates algebraically both debit and credit amounts. The result of this addition is printed as an entry balance after all entries are made. This is done in line 410 where we seek a 0.00 answer. This technique shows entry errors immediately, and you don't have to wait for a trail balance.

During the entry of data, ON

A/C #1 PETTY CASH	108.39
A/C #2 CASH IN BANK	5,965.20
A/C #3 SAVINGS ACCOUNT	2,715.42
A/C #4 PARTS INVENTORY	1,694.85
A/C #5 MERCHANDISE INVENTORY	3,040.40
A/C #6 ACCOUNTS RECEIVABLE	848.69
A/C #7 FURN. & FIXTURES, NET	2,493.70
A/C #8 SERVICE EQUIPMENT	5,830.21
A/C #9 TRUCKS AND AUTOS	8,424.98
A/C #10 BUILDING	113,443.51
A/C #11 KEOGH RETIREMENT	7,432.00
A/C #12 MISC. FIXED ASSETS	111.22
A/C #13 FICA WITHHELD	– 84.84
A/C #14 EMPLOYEE TAXES WITHHELD	– 449.25
A/C #15 ACCOUNTS PAYABLE	– 521.10
A/C #16 NOTES PAYABLE	– 1,500.00
A/C #17 SALES TAX DUE	– 338.14
A/C #18 MORTGAGE PAYABLE	– 89,988.73
A/C #19 KEOGH, EMPLOYEES CONTRIB.	– 3,918.68
A/C #20 JENKINS CAPITAL	– 55,307.83
A/C #21 SALES SERVICE LABOR	– 7,591.43
A/C #22 SALES SERVICE PARTS	– 2,483.50
A/C #23 SALES, MERCHANDISE	– 4,118.73
A/C #24 INTEREST EARNED	– 34.59
A/C #25 MISCL. INCOME	– 10.56
A/C #26 PURCHASES, PARTS	1,533.28
A/C #27 PURCHASES, MERCHANDISE	2,101.01
A/C #29 PAYROLL	3,026.13
A/C #30 FICA EXPENSE	69.77
A/C #31 AUTO & TRUCK EXPENSE	142.33
A/C #32 BAD DEBTS	91.18
A/C #33 TELEPHONE EXPENSE	56.25
A/C #34 POSTAGE	15.00
A/C #35 INTEREST PAID	529.50
A/C #36 DUES & SUBSCRIPTIONS	17.00
A/C #37 INSURANCE	201.00
A/C #39 MAINTENANCE, BUILDING	76.34
A/C #40 UTILITIES, GAS, ELEC., WATER	207.60
A/C #41 OFFICE EXPENSE	31.04
A/C #42 SERV. EQUIP. MAINTENANCE	18.95
A/C #45 SHIPPING EXPENSE	1.45
A/C #46 SERVICE EXPENSE	51.07
A/C #47 MISCL. EXPENSE	4.14
A/C #48 JENKINS WITHDRAWALS	2,300.00
A/C #49 PROFIT AND LOSS	3,765.77
DEBIT/CREDIT DIFFERENCE =	$0.00

Sample 2. Typical Trial Balance from Annual Cumulative Data

ASSETS		
CURRENT		
A/C #1 PETTY CASH	108.39	
A/C #2 CASH IN BANK	5,965.20	
A/C #3 SAVINGS ACCOUNT	2,715.42	
A/C #4 PARTS INVENTORY	1,694.85	
A/C #5 MERCHANDISE INVENTORY	3,040.40	
A/C #6 ACCOUNTS RECEIVABLE	848.69	
TOTAL CURRENT		$14,372.95
FIXED		
A/C #7 FURN. & FIXTURES, NET	2,493.70	
A/C #8 SERVICE EQUIPMENT	5,830.21	
A/C #9 TRUCKS AND AUTOS	8,424.98	
A/C #10 BUILDING	113,443.51	
A/C #11 KEOGH RETIREMENT	7,432.00	
A/C #12 MISC. FIXED ASSETS	111.22	
TOTAL FIXED		$137,735.62
TOTAL ASSETS		$152,108.57
LIABILITIES		
CURRENT		
A/C #13 FICA WITHHELD	−84.84	
A/C #14 EMPLOYEE TAXES WITHHELD	−449.25	
A/C #15 ACCOUNTS PAYABLE	−521.10	
A/C #16 NOTES PAYABLE	−1,500.00	
A/C #17 SALES TAX DUE	−338.14	
TOTAL CURRENT		−$2,893.33
FIXED & NET WORTH		
A/C #18 MORTGAGE PAYABLE	−89,988.73	
A/C #19 KEOGH, EMPLOYEES CONTRIB.	−3,918.68	
A/C #20 JENKINS CAPITAL	−55,307.83	
TOTAL FIXED & NET WORTH		−$149,215.24
TOTAL LIABILITIES & NET WORTH		−$152,108.57

Sample 3. Typical Balance Sheet

GOSUB commands are used. Because of the number of accounts, you can't get all GOSUB line numbers on one line. Lines 350 through 390 show how two lines are used.

The Trial Balance

The trial balance prints out all accounts one after the other, with their positive (debit balances) or negative (credit balances). Accounts not used have zero balances and are not printed. The amounts are accumulated algebraically in line 580, and the results printed in lines 600 and 610. Here again we are looking for a zero balance. The recording of updated information is accomplished in lines 620 through 650. The CHR$(12) PRINT command in line 660 advances the paper in the author's printer to the next sheet. The trial balance may be used with monthly or year-to-date data, and is customarily used with both.

The profit and loss statement for year-to-date data is the conventional income and expense statement. The cost of goods sold, in the Jenkins report, prints out with a zero balance. This is a reminder to the reader that the account has not been journalized. It is normally figured from opening and closing inventories and purchases. In a small business, the taking of inventory is usually done once a year. It can be estimated, however it wasn't done in the Jenkins P & L. This assumes purchases account for all merchandising and parts sold.

Note that net profit is figured by deducting expenses and withdrawals from the gross profit amount. For income tax purposes, withdrawals cannot be called an expense and the profit amount calculated in lines 880 and 890 as income is used. Since income accounts have a credit balance, the sign is changed in line 880 by dividing by −1 to get a correct profit calculation.

There is another way to calculate net profit. This method is used in the end-of-month procedure as a check on the accuracy of the amount in the P & L statement.

Balance Sheet

The balance sheet is the most important indicator of the health of a business. The method used here is a straightforward presentation of assets, liabilities and net worth. All the dollar amounts are taken from their respective accounts; none is calculated in preparing the statement. Assets should balance liabilities and net worth. In addition, not all businesses require fixed and current assets or liabilities, but they are provided in this case to show programming possibilities.

End of Month Procedure

At the end of each month or accounting period, it is necessary to add the month's figures to the year-to-date or annual totals. Since the year-to-date and monthly accounts use the same variables, however, we can't read the monthly tape without destroying the annual one. To stop this, move the data from the annual to other variable storage registers. Provide variables for expense and income accounts. Then add the prime variables from the monthly tape to the annual to give an updated total for the year. Note: we do not need this technique for assets and liabilities, since these are correct each month. We merely destroy outdated annual information in the process.

Change overs are incorporated in lines 1360 to 1560. There are a couple of items that may need clarifying, however. There is another way to determine profit and loss. It is the difference between Jenkins' capital account for the previous period and the capital account for the present. First compute the capital for the present by adding asset and liability accounts algebraically (line 1460). The net remainder is the amount of capital. Using the current capital amount, profit and loss is calculated in line 1470. The capital account is corrected in line 1480. We can now write the updated annual tape.

To upgrade the monthly tape for use in the next month, we want to preserve only the asset and liability accounts, and zero the income and expense accounts. The zeroing is done in line 1520, after which the monthly tape is written, ready for the

INCOME		
A/C #21 SALES SERVICE LABOR	−7,591.43	
A/C #22 SALES SERVICE PARTS	−2,483.50	
A/C #23 SALES, MERCHANDISE	−4,118.73	
A/C #24 INTEREST EARNED	−34.59	
A/C #25 MISCL. INCOME	−10.56	
TOTAL INCOME		−$14,238.81
COST OF GOODS SOLD		$0.00
GROSS PROFIT		−$14,238.81
EXPENSES		
A/C #26 PURCHASES, PARTS	1,533.28	
A/C #27 PURCHASES, MERCHANDISE	2,101.01	
A/C #29 PAYROLL	3,026.13	
A/C #30 FICA EXPENSE	69.77	
A/C #31 AUTO & TRUCK EXPENSE	142.33	
A/C #32 BAD DEBTS	91.18	
A/C #33 TELEPHONE EXPENSE	56.25	
A/C #34 POSTAGE	15.00	
A/C #35 INTEREST PAID	529.50	
A/C #36 DUES & SUBSCRIPTIONS	17.00	
A/C #37 INSURANCE	201.00	
A/C #39 MAINTENANCE, BUILDING	76.34	
A/C #40 UTILITIES, GAS, ELEC., WATER	207.60	
A/C #41 OFFICE EXPENSE	31.04	
A/C #42 SERV. EQUIP. MAINTENANCE	18.95	
A/C #45 SHIPPING EXPENSE	1.45	
A/C #46 SERVICE EXPENSE	51.07	
A/C #47 MISCL. EXPENSE	4.14	
TOTAL EXPENSES		$8,173.04
PROFIT		$6,065.77
LESS JENKINS WITHDRAWALS		$2,300.00
NET PROFIT		$3,765.77

Sample 4. Typical Profit and Loss Statement

A/C #1 PETTY CASH	108.39
A/C #2 CASH IN BANK	5,965.20
A/C #3 SAVINGS ACCOUNT	2,715.42
A/C #4 PARTS INVENTORY	1,694.85
A/C #5 MERCHANDISE INVENTORY	3,040.40
A/C #6 ACCOUNTS RECEIVABLE	848.69
A/C #7 FURN. & FIXTURES, NET	2,493.70
A/C #8 SERVICE EQUIPMENT	5,830.21
A/C #9 TRUCKS AND AUTOS	8,424.98
A/C #10 BUILDING	113,443.51
A/C #11 KEOGH RETIREMENT	7,432.00
A/C #12 MISC. FIXED ASSETS	111.22
A/C #13 FICA WITHHELD	−84.84
A/C #14 EMPLOYEE TAXES WITHHELD	−449.25
A/C #15 ACCOUNTS PAYABLE	−521.10
A/C #16 NOTES PAYABLE	−1,500.00
A/C #17 SALES TAX DUE	−338.14
A/C #18 MORTGAGE PAYABLE	−89,988.73
A/C #19 KEOGH, EMPLOYEES CONTRIB.	−3,918.68
A/C #20 JENKINS CAPITAL	−55,307.83
DEBIT/CREDIT DIFFERENCE =	−$0.00

Sample 5. Monthly Data After Clearing

"If you missed us at the shows... If you can't visit our store...

Madison Square Garden, NY, March 1981

Programs Unlimited Retail Center, Jericho, NY

NAME THAT SONG

FROM SOFTWARE INNOVATIONS

A wonderful new sound program for the 32K Disk TRS-80. The game is played similar to the popular TV show and consists of 3 separate rounds in which 2 players try to name popular tunes. Fast action and non-stop graphics make it great for parties or just playing around. NAME THAT SONG comes with over 100 tunes, and you can add your own using the provided utility. More song files will be available soon at no charge.

19.95

SUPERHOST
NOW FOR THE MODEL III
32K Disk System

SUPERHOST by Clayton Schneider turns your Model III into a true host computer allowing others to access your computer from any type terminal. (Auto answer modem required.) A PROGRAMS UNLIMITED EXCLUSIVE!—Runs on NEWDOS, NEWDOS-80, TRSDOS—Data-in and Data-out translation tables—Correctly advances the date on all DOS's—Masks out undesirable characters (i.e. BREAK)—Remembers the date and time after reboot—Lowercase driver option—Optional password entry—Automatic disconnect upon loss of carrier—Sets Nulls and Line feeds—Plus, many more outstanding features!

39.95

How to order:

CALL TOLL-FREE:
(800) 645-6038 (except NY*)

COMPUTER TO COMPUTER:
Call (516) 334-3134

WRITE: Dept. 581M,
Box 265, Jericho, NY 11753

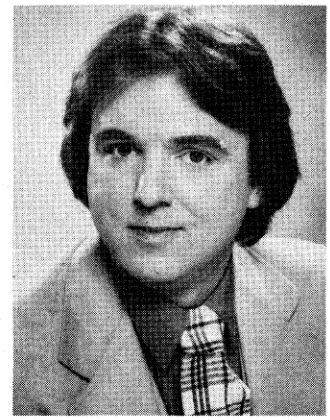
master charge

*NY State residents call (516) 997-8668. (If placing an order, please call collect.)

VISA

"...drop into our ad!"

says Richard Taylor, noted software author and President, Programs Unlimited



The programs and peripherals listed here are among more than 600 that our store and our show customers can try out *before* they buy.

So they have to be good. That simple fact, coupled with our no-holds-barred guarantee, gives you every reason to order from us with confidence.

SUPERHOST—32K Disk I/III	$29.95
DIRINDEX—32K Disk	19.95
ZAP—32K Disk	29.95
THE WIZARD—32K Disk I/III	19.95
LDOS—32K Disk	139.00
MISSILE ATTACK-16K Mod I/III	14.95
ORCHESTRA-80—16K Mod I	79.95
ORCHESTRA-85—16k Mod I	CALL
Z80A SPEED-UP Mod I	199.95
ZORK—32K Disk	39.95
DECATHLON	24.95
SMART III CASSETTE TERMINAL PROGRAM Mod III—16K	99.95
AUTO ANSWER/DIAL CONNECTION (Direct Connect Modem)	279.95
TRS-OPERA—16K Mod I/III	9.95
CHALLENGE—16K Mod I/III	9.95
MESSAGE-80—48K 2 Disk I/III	149.95
PERCOM DOUBLER	219.00
DOUBLER ZAP II NEWDOS-80	49.95
DOUBLE ZAP II NEWDOS 2.1	39.95
QUICK FIX Disk Utility—32K Disk	39.95
QS LIGHT PEN	19.95
SARGON II—32K Disk	34.95
BASKETBALL—16K LII	15.95
EPSON MX80B	CALL
GREEN SCREEN Mod I	19.95
GREEN SCREEN Mod II/III	24.95
WABASH DOUBLE DENSITY DISKETTES (10)	34.95
MICROSOFT BASIC DECODED	25.00

Ask for our FREE catalog

FULL GUARANTEE

If you are for any reason dissatisfied with any purchase that you make from **PROGRAMS UNLIMITED,** return the merchandise in its original condition and its original packaging within 14 days for a prompt, full refund.

the software source™

Visit our new Retail Center at 20 Jericho Tpke., Jericho, Long Island, NY. Call (516) 333-2266 for hours & directions.

✓110

PROGRAMS UNLIMITED™

next month's entries. Although the end of the period procedure is a little complex, the operator sees only the read and write requests in lines 1370, 1420, 1500 and 1540.

If you stay in the account breakdown listed, you should have no trouble adapting the program to your needs. If the Jenkins case uses more accounts than you, just show zero balances for the unused accounts.

The account numbering system shown here is required for the several ON GOSUB functions. You could use your own account numbers followed by dash numbers. Entries would be made by dash number.

Adding more expense accounts is fairly simple. Suppose, for example, that you also need an advertising account. Try this:

```
Delete 2560
2560 G5 = G5 + C5; If G5 = 0 Return
2580 LPRINT "A/C #50 Advertising Ex-
pense";Tab(40);Using A$; G5:Return
2600 END
390 (Add by Editing ',2560' after 2500)
550 (Add by Editing ',2560' After 2500)
570 (Change '49' to '50')
580 (Add '+G5' at end of line)
840 (Add',2560' at end of line)
860 (Add '+G5' at end of line)
3030 (Add ',G5' at end of line)
4030 (Add ',G5' at end of line)
```

This system, as exemplified by the Jenkins example has proved to be a practical time saver. ■

```
10 'JENKINS SERVICE COMPANY GENERAL LEDGER
20 DEFSTR Q
30 DEFDBL A-P
40 CLS
60 LET A$ = "###,###.##"
70 LET D$ = "$$###,###.##"
80 C1 = 0
90 INPUT "LOAD DATA TAPE. PRESS ENTER";C1
100 IF C1 = 0 GOSUB 3000 ELSE GOTO 80
110 INPUT "ENTER DATE AS MO/DA/YR";Q
120 INPUT "IF MONTHLY DATA ENTER 1. IF ANNUAL CUMULATIV
    E DATA ENTER 2";C2
130 CLS
140 PRINT TAB(20); "MENU": PRINT
150 PRINT "1 FOR ENTRIES"
160 PRINT "2 FOR TRIAL BALANCE"
170 PRINT "3 FOR PROFIT AND LOSS STATEMENT"
180 PRINT "4 FOR BALANCE SHEET"
190 PRINT "5 FOR END OF MONTH PROCEDURE":PRINT
200 INPUT "ENTER SELECTION NUMBER";C3
210 IF C3 <> 1 GOTO 430
220 LPRINT "JENKINS SERVICE ENTRIES AS OF ";Q
230 IF C2 = 1 LPRINT "MONTHLY DATA" ELSE LPRINT "ANNUAL
     CUMULATIVE DATA"
240 INPUT "ENTER ACCOUNT NUMBER. IF NONE ENTER 0";C4
250 IF C4 = 0 GOTO 410
260 INPUT "ENTER AMOUNT. IF SAME PRESS ENTER";C5
270 IF C5 = 0 GOTO 290
280 C6 = C5: GOTO 300
290 C5 = C6
300 C$ = "0"
310 INPUT "ENTER C IF CREDIT AMOUNT";C$
320 IF C$ = "C" THEN C5 = -C5
330 C7 = C7 + C5
340 LPRINT TAB(30) "#"; C4; TAB(40) C5
350 IF C4 >45 GOTO 380
360 ON C4 GOSUB 1580,1600,1620,1640,1660,1680,1700,1720
    ,1740,1760,1780,1800,1820,1840,1860,1880,1900,1920
    ,1940,1960,1980,2000,2020,2040,2060,2080,2100,2120
    ,2140,2160,2180,2200,2220,2240,2260,2280,2300,2320
    ,2340,2360,2380,2400,2420,2440,2460
370 GOTO 400
380 P9 = C4-45
390 ON P9 GOSUB 2480 ,2500 ,2520 ,2540
400 C5 = 0:GOTO 240
410 CLS:LPRINT :LPRINT "ENTRY BALANCE";USING A$;C7
420 INPUT "FOR THE MENU, TYPE 1";X1:IF X1 = 1 GOTO 130

430 IF C3 = 2 GOTO 470
440 IF C3 = 3 GOTO 680
450 IF C3 = 4 GOTO 940
460 IF C3 = 5 GOTO 1360
470 LPRINT "JENKINS SERVICE AS OF ";Q
480 IF C2 = 1 LPRINT "MONTHLY DATA" ELSE LPRINT "ANNUAL
     CUMULATIVE DATA"
490 LPRINT TAB(4) STRING$(15,"-");"TRIAL BALANCE";STRIN
    G$(15,"-"):LPRINT
500 C8 = 1
510 IF C8 >45 GOTO 540
520 ON C8 GOSUB 1580,1600,1620,1640,1660,1680,1700,1720
    ,1740,1760,1780,1800,1820,1840,1860,1880,1900,1920
    ,1940,1960,1980,2000,2020,2040,2060,2080,2100,2120
    ,2140,2160,2180,2200,2220,2240,2260,2280,2300,2320
    ,2340,2360,2380,2400,2420,2440,2460
530 GOTO 560
540 C9 = C8-45
550 ON C9 GOSUB 2480 ,2500 ,2520 ,2540
560 C8 = C8 + 1
570 IF C8>49 GOTO 580  ELSE 510
580 X3 = A1+A2+A3+A4+A5+A6+A7+A8+A9+B1+B2+B3+L1+L2+L3+L
    4+L5+L6+L7+L8+I1+I2+I3+I4+I5+E1+E2+E3+E4+E5+E6+E7+
    E8+E9+F1+F2+F3+F4+F5+F6+F7+F8+F9+G1+G2+G3+G4+H1+H2
590 LPRINT
600 LPRINT TAB(15) "DEBIT/CREDIT DIFFERENCE = ";
610 LPRINT USING D$;X3
620 D2 = 0:INPUT "TO RECORD TRIAL BALANCE PREPARE DATA
    CASSETTE FOR RECORDING AND PRESS ENTER";D2
630 IF D2<> 0 GOTO 130
640 PRINT "TRIAL BALANCE BEING RECORDED"
650 GOSUB 4000
660 LPRINT CHR$(12)
670 GOTO 130
680 LPRINT "JENKINS SERVICE CO. AS OF ";Q
690 IF C2 = 1 LPRINT "MONTHLY DATA" ELSE LPRINT "ANNUAL
     CUMULATIVE DATA"
700 LPRINT TAB(10) STRING$(15,"-");"PROFIT & LOSS STATE
    MENT";STRING$(15,"-")
710 LPRINT
720 LPRINT "INCOME"
730 GOSUB 1980
740 GOSUB 2000
750 GOSUB 2020
760 GOSUB 2040
770 GOSUB 2060
780 D3 = I1+I2+I3+I4+I5
790 LPRINT TAB(10)"TOTAL INCOME";TAB(50) USING D$;D3
800 LPRINT TAB(10)"COST OF GOODS SOLD";TAB(50)USING D$;
    E3
810 LPRINT TAB(20)"GROSS PROFIT";TAB(50)USING D$;D3-E3
820 LPRINT:LPRINT "EXPENSES"
830 D4=1
840 ON D4 GOSUB 2080 ,2100 ,2140 ,2160 ,2180 ,2200 ,222
    0 ,2240 ,2260 ,2280 ,2300 ,2320 ,2340 ,2360 ,2380
    ,2400 ,2420 ,2440 ,2460 ,2480 ,2500
850 D4 = D4+1:IF D4<>22 GOTO 840
860 D5=E1+E2+E4+E5+E6+E7+E8+E9+F1+F2+F3+F4+F5+F6+F7+F8+
    F9+G1+G2+G3+G4
870 LPRINT TAB(10) "TOTAL EXPENSES";TAB(50)USING D$;D5
880 D6 = ((D3-E3)/-1)-D5
890 LPRINT TAB(10)"PROFIT";TAB(50)USING D$;D6
900 LPRINT TAB(10)"LESS JENKINS WITHDRAWALS";TAB(50)USI
    NG D$;H1
910 LPRINT:LPRINT TAB(10)"NET PROFIT";TAB(50)USING D$;D
    6-H1
920 LPRINT CHR$(12)
930 INPUT "FOR THE MENU, TYPE 1";X2: IF X2 = 1 GOTO 130

940 LPRINT "JENKINS SERVICE CO. AS OF ";Q
950 IF C2 = 1 LPRINT "MONTHLY DATA" ELSE LPRINT "ANNUAL
     CUMULATIVE DATA"
960 LPRINT TAB(10) STRING$(15,"-");"BALANCE SHEET";STRI
    NG$(15,"-"):LPRINT
970 LPRINT "ASSETS"
980 LPRINT TAB(10)"CURRENT"
990 GOSUB 1580
1000 GOSUB 1600
1010 GOSUB 1620
1020 GOSUB 1640
1030 GOSUB 1660
1040 GOSUB 1680
1050 D7 = A1+A2+A3+A4+A5+A6
1060 LPRINT TAB(10)"TOTAL CURRENT";TAB(50)USING D$;D7
1070 LPRINT:LPRINT TAB(10)"FIXED"
1080 GOSUB 1700
1090 GOSUB 1720
1100 GOSUB 1740
1110 GOSUB 1760
1120 GOSUB 1780
1130 GOSUB 1800
1140 D8 =A7+A8+A9+B1+B2+B3
1150 LPRINT TAB(10)"TOTAL FIXED";TAB(50)USING D$;D8:LPR
     INT
1160 LPRINT TAB(20)"TOTAL ASSETS";TAB(50)USING D$;D7+D8
     :LPRINT
1170 LPRINT "LIABILITIES"
1180 LPRINT TAB(10)"CURRENT"
1190 GOSUB 1820
1200 GOSUB 1840
1210 GOSUB 1860
1220 GOSUB 1880
1230 GOSUB 1900
1240 D9 = L1+L2+L3+L4+L5
1250 LPRINT TAB(10)"TOTAL CURRENT";TAB(50)USING D$;D9:L
1260 LPRINT TAB(10)"FIXED & NET WORTH"
1270 GOSUB 1920
1280 GOSUB 1940
1290 GOSUB 1960
1300 P1 = L6+L7+L8
1310 LPRINT TAB(10) "TOTAL FIXED & NET WORTH";TAB(50)US
     ING D$;P1
1320 LPRINT:LPRINT TAB(20) "TOTAL LIABILITIES & NET WOR
     TH";TAB(50)USING D$;D9+P1
```

Program continues

EAST COAST

ΩMEGA Sales Co.
12 Meeting St.
Cumberland, RI 02864

1-800-556-7586

1-401-722-1027

ΩMEGA SALES CO.

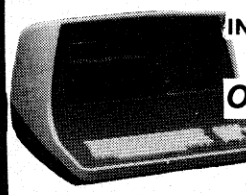
WEST COAST

ΩMEGA Sales Co.
3353 Old Conejo Rd. #102
Newbury Park, CA 91320

1-800-235-3581

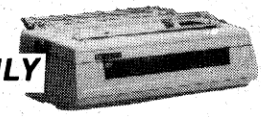
1-805-499-3678

SPECIAL OF THE MONTH!!

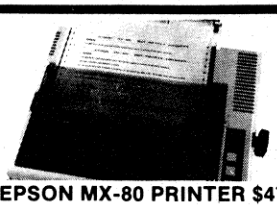


INTERTEC SUPERBRAIN 64K RAM $2849

OR TOGETHER FOR ONLY $5195



NEC 5510 SPINWRITER $2395



EPSON MX-80 PRINTER $479

INTERFACES: IEEE $55, TRS•80 $35, APPLE INTERFACE + CABLE $90, RS•232 $70

ATARI 800 $759

DIABLO 630 $1995
Tractor option $200

C-ITOH STARWRITER 25 $1595

NEC MONITOR $219

OKIDATA MICROLINE-83	$949
OKIDATA MICROLINE-80	$469
APPLE II PLUS 48K	$1150
APPLE DISK w/ 3.3 DOS Controller	$545
APPLE DISK w/o Controller	$435
BASE II PRINTER	$649
HAZELTINE 1420	$799
NORTHSTAR HORIZON II 32K QD	$2975
ATARI 400 8K	$399
ATARI 400 16K	$499
RADIO SHACK 16K Level II Model 3	$875
RADIO SHACK 64K Model 2	$3449
ANADEX DP-9500	$1249
TELEVIDEO 912C	$669
TELEVIDEO 920C	$729
TELEVIDEO 950	$1049
ATARI 825 PRINTER	$729
ATARI 850 INTERFACE	$169
ATARI 810 DISK	$449

(Call for price list of ATARI Software)

- *NO SURCHARGE FOR CREDIT CARDS*
- *WE ACCEPT C.O.D.'S*
- *ALL EQUIPMENT FACTORY FRESH W/MANUFACTURER'S WARRANTY*
- *STOCK SHIPMENTS USUALLY SAME DAY OR NEXT DAY*
- *NO HIDDEN CHARGES - WE LIVE BY OUR PUBLISHED PRICES*

VISA **EAST COAST / WEST COAST** master charge

ΩMEGA SALES COMPANY

✓389

✓See List of Advertisers on page 306

CHICATRUG News

Chicago TRS-80™* Users Group

12 Issues For Only $12.00

All The TRS-80™ News You Need When You Need It*

Now In Our 3rd Year Of Continuous Publication

One Of The Oldest TRS-80™* Newsletters Still In Circulation

— Featuring —

• Applications • Product Reviews •
• Machine Language Tutorials •
• And Much More •

Call: 312-782-9750

Write For Free Sample:

Chicatrug News ✓117
c/o EBG & Associates
203 N. Wabash Av
Chicago, IL 60601

* TRS-80™ is a Trademark of Tandy Corp.

===DRIVES===DRIVES===DRIVES===DRIVES===DRIVES===DRIVES===

::::: MPI DISK DRIVES FOR 'S-80 ON SALE :::::

TRACKS	MODEL	RAW	COMPLETE
40	(B-51)	$245.00	$309.00
40/40	(B-52)	$375.00	$445.00
80	(B-91)	$360.00	$429.00
80/80	(B-92)	$515.00	$579.00

* * * SPECIAL * * *

MODEL 3 INTERNAL DRIVES INSTALLATION KIT $435.00
SELECT ANY OF THE RAW DRIVES ABOVE, AND PRIME HIGH SPEED MEMORY SETS AT $55.00 PER 16k TO ADD ALL THE POWER THIS GREAT LITTLE COMPUTER NEEDS!!

COMPLETE YOUR DRIVE PACKAGE FOR LEVEL II WITH AN ULTRADOS DISK OPERATING SYSTEM THE MOST POWERFUL ONE YOU CAN OWN AT ONLY $59.95 OR $94.95 FOR THE "FULL BLOWN" SYSTEM WITH ALL UTILITIES.

CHECK ON OUR LIBERAL HARDWARE TRADE IN ALLOWANCE

ONE STOP COMPUTER SHOPPING

LEVEL IV PRODUCTS INC
32461 SCHOOLCRAFT RD.
LIVONIA, MICHIGAN 48150
313-525-6200 (in state)
800-521-3305(toll free)

LEVEL IV PRODUCTS

✓14

DEALER INQUIRIES INVITED, ASK FOR WHOLESALE DEPT


```
1330 LPRINT CHR$(12)
1340 INPUT "FOR ANOTHER CHOICE TYPE 1";X:IF X = 1 GOTO
1350 'END OF PERIOD PROCEDURE STARTS HERE
1360 P2 = 0
1370 INPUT "READ ANNUAL TAPE.WHEN READY PRESS ENTER";P2
1380 IF P2 = 0 GOSUB 3000 ELSE 1360
1390 J1=I1:J2=I2:J3=I3:J4=I4:J5=I5:K1=E1:K2=E2:K3=E3:K4
     =E4:K5=E5:K6=E6:K7=E7:K8=E8:K9=E9:M1=F1:M2=F2:M3=F
     3:M4=F4:M5=F5:M6=F6:M7=F7:M8=F8:M9=F9:N1=G1:N2=G2:
     N3=G3:N4=G4:N5=H1:N6=H2
1400 P3 = L8/-1
1410 P4 = 0
1420 INPUT "READ MONTHLY TAPE. WHEN READY PRESS ENTER";
     P4
1430 IF P4 =0 GOSUB 3000 ELSE 1410
1440 I1=I1+J1:I2=I2+J2:I3=I3+J3:I4=I4+J4:I5=I5+J5:E1=E1
     +K1:E2=E2+K2:E3=E3+K3:E4=E4+K4:E5=E5+K5:E6=E6+K6:E
     7=E7+K7:E8=E8+K8:E9=E9+K9:F1=F1+M1:F2=F2+M2:F3=F3+
     M3:F4=F4+M4:F5=F5+M5:F6=F6+M6:F7=F7+M7:F8=F8+M8:F9
     =F9+M9:G1=G1+N1:G2=G2+N2:G3=G3+N3
1450 G4=G4+N4:H1=H1+N5:H2=H2+N6
1460 P5=A1+A2+A3+A4+A5+A6+A7+A8+A9+B1+B2+B3+L1+L2+L3+L4
     +L5+L6+L7
1470 H2 = N6+(L8-(P5/-1))
1480 L8=P5/-1
1490 P7=0
1500 INPUT"WRITE ANNUAL TAPE. WHEN READY PRESS ENTER";P
     7
1510 IF P7<>0 GOTO 1490 ELSE GOSUB 4000
1520 I1=0:I2=0:I3=0:I4=0:I5=0:E1=0:E2=0:E3=0:E4=0:E5=0:
     E6=0:E7=0:E8=0:E9=0:F1=0:F2=0:F3=0:F4=0:F5=0:F6=0:
     F7=0:F8=0:F9=0:G1=0:G2=0:G3=0:G4=0:H1=0:H2=0
1530 P8=0
1540 INPUT "WRITE MONTHLY TAPE.WHEN READY PRESS ENTER";
     P8
1550 IF P8<>0 GOTO 1530 ELSE GOSUB 4000
1560 GOTO 130
1570 'ACCOUNT I.D. STARTS HERE
1580 A1=A1+C5:IF A1 = 0 RETURN
1590 LPRINT "A/C #1 PETTY CASH";TAB(40)USING A$;A1:RETU
     RN
1600 A2=A2+C5:IF A2 = 0 RETURN
1610 LPRINT "A/C #2 CASH IN BANK";TAB(40)USINGA$;A2:RET
     URN
1620 A3=A3+C5:IF A3 = 0 RETURN
1630 LPRINT "A/C #3 SAVINGS ACCOUNT";TAB(40)USING A$;A3
     :RETURN
1640 A4=A4+C5:IF A4 = 0 RETURN
1650 LPRINT "A/C #4 PARTS INVENTORY";TAB(40)USING A$;A4
     :RETURN
1660 A5=A5+C5: IF A5 = 0 RETURN
1670 LPRINT "A/C #5 MERCHANDISE INVENTORY";TAB(40)USING
      A$;A5:RETURN
1680 A6=A6+C5:IF A6 = 0 RETURN
1690 LPRINT "A/C #6 ACCOUNTS RECEIVABLE";TAB(40)USING A
     $;A6:RETURN
1700 A7=A7+C5:IF A7 = 0 RETURN
1710 LPRINT "A/C #7 FURN. & FIXTURES,NET";TAB(40)USING
     A$;A7:RETURN
1720 A8=A8+C5: IF A8 = 0 RETURN
1730 LPRINT "A/C #8 SERVICE EQUIPMENT";TAB(40)USING A$;
     A8:RETURN
1740 A9=A9+C5: IF A9 = 0 RETURN
1750 LPRINT "A/C #9 TRUCKS AND AUTOS";TAB(40)USING A$;A
     9:RETURN
1760 B1=B1+C5:IF B1 = 0 RETURN
1770 LPRINT "A/C #10 BUILDING";TAB(40)USING A$;B1:RETUR
     N
1780 B2=B2+C5:IF B2 = 0 RETURN
1790 LPRINT "A/C #11 KEOGH RETIREMENT";TAB(40)USING A$;
     B2:RETURN
1800 B3=B3+C5: IF B3 = 0 RETURN
1810 LPRINT "A/C #12 MISC. FIXED ASSETS";TAB(40)USING A
     $;B3:RETURN
1820 L1=L1+C5: IF L1 = 0 RETURN
1830 LPRINT "A/C #13 FICA WITHHELD";TAB(40)USING A$;L1:
     RETURN
1840 L2=L2+C5: IF L2 = 0 RETURN
1850 LPRINT "A/C #14 EMPLOYEE TAXES WITHHELD";TAB(40)US
     ING A$;L2:RETURN
1860 L3=L3+C5: IF L3 = 0 RETURN
1870 LPRINT "A/C #15 ACCOUNTS PAYABLE";TAB(40)USING A$;
     L3:RETURN
1880 L4=L4+C5: IF L4 = 0 RETURN
1890 LPRINT "A/C #16 NOTES PAYABLE";TAB(40)USING A$;L4:
     RETURN
1900 L5=L5+C5: IF L5 = 0 RETURN
1910 LPRINT "A/C #17 SALES TAX DUE";TAB(40)USING A$;L5:
     RETURN
1920 L6=L6+C5: IF L6 = 0 RETURN
1930 LPRINT "A/C #18 MORTGAGE PAYABLE";TAB(40)USING A$;
     L6:RETURN
1940 L7=L7+C5: IF L7 = 0 RETURN
1950 LPRINT "A/C #19 KEOGH,EMPLOYEES CONTRIB.";TAB(40)U
     SING A$;L7:RETURN
1960 L8=L8+C5: IF L8 = 0 RETURN
```

Program continues

```
1970 LPRINT "A/C #20 JENKINS CAPITAL";TAB(40)USING A$;L
     8: RETURN
1980 I1=I1+C5:IF I1 = 0 RETURN
1990 LPRINT "A/C #21 SALES SERVICE LABOR";TAB(40)USING
     A$;I1:RETURN
2000 I2=I2+C5: IF I2 = 0 RETURN
2010 LPRINT "A/C #22 SALES SERVICE PARTS";TAB(40)USING
     A$;I2:RETURN
2020 I3=I3+C5:IF I3 = 0 RETURN
2030 LPRINT "A/C #23 SALES, MERCHANDISE";TAB(40)USING A
     $;I3:RETURN
2040 I4=I4+C5:IF I4 = 0 RETURN
2050 LPRINT "A/C #24 INTEREST EARNED";TAB(40)USING A$;I
     4:RETURN
2060 I5=I5+C5: IF I5 = 0 RETURN
2070 LPRINT "A/C #25 MISCL. INCOME";TAB(40)USING A$;I5:
     RETURN
2080 E1=E1+C5: IF E1 = 0 RETURN
2090 LPRINT "A/C #26 PURCHASES,PARTS";TAB(40)USING A$;E
     1:RETURN
2100 E2=E2+C5:IF E2 = 0 RETURN
2110 LPRINT "A/C #27 PURCHASES, MERCHANDISE";TAB(40)USI
     NG A$;E2:RETURN
2120 E3=E3+C5: IF E3 = 0 RETURN
2130 LPRINT "A/C #28 COST OF GOODS SOLD";TAB(40)USING A
     $;E3:RETURN
2140 E4=E4+C5: IF E4 = 0 RETURN
2150 LPRINT "A/C #29 PAYROLL";TAB(40)USING A$;E4:RETURN
2160 E5=E5+C5: IF E5 = 0 RETURN
2170 LPRINT "A/C #30 FICA EXPENSE";TAB(40)USING A$;E5:R
     ETURN
2180 E6=E6+C5: IF E6 = 0 RETURN
2190 LPRINT "A/C #31 AUTO & TRUCK EXPENSE";TAB(40)USING
      A$;E6:RETURN
2200 E7=E7+C5: IF E7 = 0 RETURN
2210 LPRINT "A/C #33 TELEPHONE EXPENSE";TAB(40)USING A$
     RN
2220 E8=E8+C5: IF E8 = 0 RETURN
2230 LPRINT "A/C #33 TELEPHONE EXPENSE"?TAB(40)USING A$
     ;E8:RETURN
2240 E9=E9+C5: IF E9 = 0 RETURN
2250 LPRINT "A/C #34 POSTAGE";TAB(40)USING A$;E9:RETURN
2260 F1=F1+C5: IF F1 = 0 RETURN
2270 LPRINT "A/C #35 INTEREST PAID";TAB(40)USING A$;F1:
     RETURN
2280 F2=F2+C5: IF F2 = 0 RETURN
2290 LPRINT "A/C #36 DUES & SUBSCRIPTIONS";TAB(40)USING
      A$;F2:RETURN
2300 F3=F3+C5: IF F3 = 0 RETURN
2310 LPRINT "A/C #37 INSURANCE";TAB(40)USING A$;F3:RETU
     RN
2320 F4=F4+C5: IF F4 = 0 RETURN
2330 LPRINT "A/C #38 DEPRECIATION";TAB(40)USING A$;F4:R
     ETURN
2340 F5=F5+C5: IF F5 = 0 RETURN
2350 LPRINT "A/C #39 MAINTENANCE,BUILDING";TAB(40)USING
      A$;F5:RETURN
2360 F6=F6+C5: IF F6 = 0 RETURN
2370 LPRINT "A/C #40 UTILITIES,GAS,ELEC.,WATER";TAB(40)
     USING A$;F6:RETURN
2380 F7=F7+C5: IF F7 = 0 RETURN
2390 LPRINT "A/C #41 OFFICE EXPENSE";TAB(40)USING A$;F7
     :RETURN
2400 F8=F8+C5: IF F8 = 0 RETURN
2410 LPRINT "A/C #42 SERV. EQUIP. MAINTENANCE";TAB(40)U
     SING A$;F8:RETURN
2420 F9=F9+C5: IF F9 = 0 RETURN
2430 LPRINT "A/C #43 PERSONAL PROPERTY TAX";TAB(40) USI
     NG A$;F9:RETURN
2440 G1=G1+C5: IF G1 = 0 RETURN
2450 LPRINT "A/C #44 WORKMEN'S COMPENSATION";TAB(40)USI
     NG A$;G1:RETURN
2460 G2=G2+C5: IF G2 = 0 RETURN
2470 LPRINT "A/C #45 SHIPPING EXPENSE";TAB(40)USING A$;
     G2:RETURN
2480 G3=G3+C5: IF G3 = 0 RETURN
2490 LPRINT "A/C #46 SERVICE EXPENSE";TAB(40)USING A$;G
     3:RETURN
2500 G4=G4+C5: IF G4 = 0 RETURN
2510 LPRINT "A/C #47 MISCL. EXPENSE"; TAB(40)USING A$;G
     4:RETURN
2520 H1=H1+C5: IF H1 = 0 RETURN
2530 LPRINT "A/C #48 JENKINS WITHDRAWALS";TAB(40)USING
     A$;H1:RETURN
2540 H2=H2+C5: IF H2 = 0 RETURN
2550 LPRINT "A/C #49 PROFIT AND LOSS";TAB(40)USING A$;H
     2:RETURN
2560 END
3000 INPUT #-1,A1,A2,A3,A4,A5,A6,A7,A8,A9,B1,B2,B3
3010 INPUT #-1,L1,L2,L3,L4,L5,L6,L7,L8,I1,I2,I3,I4,I5
3020 INPUT #-1,E1,E2,E3,E4,E5,E6,E7,E8,E9,F1,F2,F3
3030 INPUT #-1,F4,F5,F6,F7,F8,F9,G1,G2,G3,G4,H1,H2
3040 RETURN
4000 PRINT #-1,A1,A2,A3,A4,A5,A6,A7,A8,A9,B1,B2,B3
4010 PRINT #-1,L1,L2,L3,L4,L5,L6,L7,L8,I1,I2,I3,I4,I5
4020 PRINT #-1,E1,E2,E3,E4,E5,E6,E7,E8,E9,F1,F2,F3
4030 PRINT #-1,F4,F5,F6,F7,F8,F9,G1,G2,G3,G4,H1,H2
4040 RETURN
```


A closer look at ....
Counters

"Let early education be a sort of amusement. You will then be better able to discover the natural bent."
... PLATO ...

Counters is a sound-and-graphics game designed to encourage a natural progression of stages in a child's developing concept of number.

Once COUNTERS is running, adult supervision is not necessary. However, learning value is greatly enhanced when an adult drops in with occasional comments, and the program is designed for three-way interaction between child, COUNTERS, and adult.

There are three modes of play, which may be selected by child or adult at the beginning of play.

Mode One The computer draws a number of geometric figures (i.e., squares, triangles, or diamonds.) Each figure is accompanied by a musical identifier phrase. The child counts the total number and presses the appropriate key. A correct answer receives an exploding star on the screen and a happy tune. The child receives a 10 point score (which is useful in teaching to count by tens), and another cheery tune. CONCEPT EXPERIENCE: Number as quantifier. Number as enumerator of similar items.

Mode Two The computer draws a variety of different figures, and the child again counts the total. An adult, (or, preferably, an older child) can point out that the total number is made up of groups of several different kinds. In later stages, MODE TWO is an endless source of elementary addition problems. CONCEPT EXPERIENCE: Counting by groups of similar objects. Concept of a "total". Basic process of addition.

Mode Three The computer again draws a variety of figures, but requests the child to count only one kind. He/she must discriminate accurately between shapes, a necessary precondition to reading. CONCEPT EXPERIENCE: Shape discrimination. Basic process of subtraction.

Counters can be played by sound alone, as each game-event is signaled by a musical phrase. With practice, vision-impaired children can play all modes. The Manual contains a section HINTS ON TEACHING WITH COUNTERS, to assist parents and teachers. Teachers will find COUNTERS a flexible tool which can easily be incorporated into any style of teaching.

Color Computer or TRS-80, model 1 (16K) $14.95 + $1.50 shipping
VISA & MASTERCHARGE Color Computer & TRS-80 (TM) Tandy Corp.

The Changer converts your TV to ever-changing color & melody/Color computer only

Quick Plan for personal projects/TRS-80 model 1 (16K)

Sprouts #1 contains two graphics & music programs for young children TRS-80 & Color Computer

Catalog

Any cassette $14.95 + $1.50 shipping available now from:

strawberry software inc.
✓93
206-463-3707
BOX 743, VASHON ISLAND, WA. 98070

Intelligence for small computers

✓See List of Advertisers on page 306

Shake hands with this $59.95 alternative to an E/I.

LNW Research Expansion Board

Ian Hodgson
296 Malcolm Circle
Dorval, Quebec,
Canada H9S 1T7

While the Level II, 16K TRS-80 is a lot of machine for not much money, it becomes evident that for serious work more memory and disk drives are essential.

The first equipment I investigated was the RS expansion interface. At $837 for the interface with 32K RAM, $160 for the RS232 board, and $45 for the communications software it looked like a grand total of $1042 just to connect the drives and add a bit of memory. There had to be a cheaper way.

I then saw the ad from LNW Research for their TRS-80 expansion board. I ordered one for $59.95: It is a 9½ × 11½ inch, double-sided, soldermasked, glass epoxy board.

The board has provisions for:

- up to 32K extra memory
- floppy disk controller
- parallel printer port
- dual cassette port
- real time clock
- RS232 port (can also be used for 20mA loop)
- onboard power supply
- bus for expansion

All features are optional. The manual includes itemized parts, lists for each option, enabling you to build only the sections you want.

I chose everything except the power supply and the dual cassette port, so the first job was to look for the necessary parts. Although the manual does mention parts substitutions, they don't cover the UART, a Western Digital TR1602B. I have used both an AY-5-1013A and an AY-3-1014A with fine results. One word of warning: If you haven't bought any 74LS IC's lately, be prepared for a shock when you see the current prices. I kept the bill to less than $280, including memory, so the entire expansion was built for about $370 Canadian—a lot less than $1042 for the RS interface.

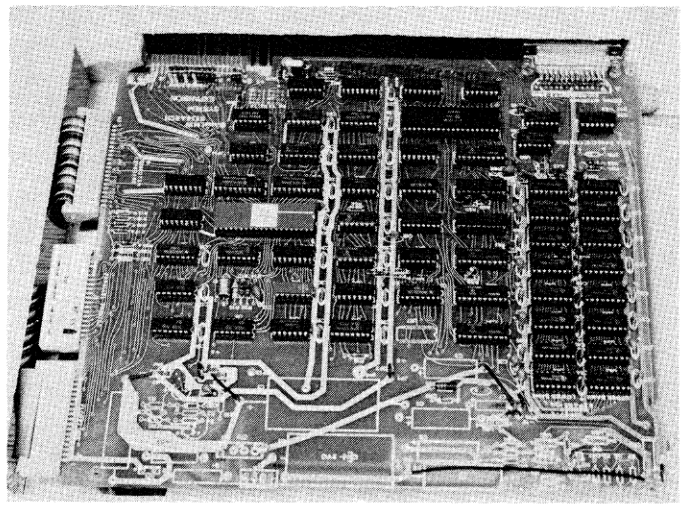
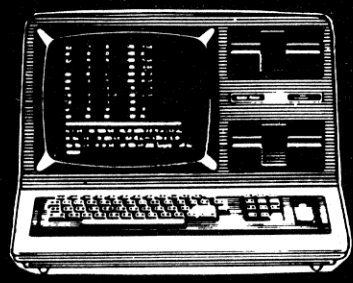


Photo 1. The expansion board installed behind the TRS-80. At left, from front to back, are the disk drive connector, parallel printer port, and keyboard connector. At rear, left, is the expansion connector, and at right, the RS232 connector. The two 40-pin chips are the UART and the disk controller. The vacant area in front is for the power supply.

The RS232 port is well provided with handshaking, and Request to Send (RTS), Clear to Send (CTS), Data Terminal Ready (DTR), Data Set Ready (DSR), Carrier Detect (CD), and Ring Indicator (RI) are all implemented, as well as provision for generating a true BREAK signal. In addition, the serial data appears at one bit (IN OE8H, bit 1) and the port may be wired for 20mA operation if desired. Although the TRS-80 may be set up either as a data terminal (DTE) or data communication device (DCE), the handshaking lines are fully implemented only for DTE. There is no provision for



NATIONAL TRS-80®

MICROCOMPUTER SHOW

New York Statler
Exposition Hall
(opposite Pennsylvania Railroad Station
and Madison Square Garden)
7th Ave. & 33rd Street

May 21, 22, 23, 1981
Thursday Noon to 6 PM
Friday 11 AM to 6 PM
Saturday 10 AM to 4 PM

For the Businessman, Educator, Professional and Hobbyist.

- Commercial Exhibits and Sales of Microcomputers, Software, Books, Magazines, Supplies, Parts, Printers, Etc.
- Free Seminars
- Famous Name Guest Speakers.
- User Groups. (Mod I, II, III, Color and Pocket Computers).
- Door Prizes - A TRS-80® Computer will be given away free each day, plus other prizes.

Avoid standing on line - Send in your registration today!

Radio Shack and TRS-80 are registered trademarks of Tandy Corporation, which has no relationship to Kengore Corporation or The National TRS-80 Microcomputer Show.

REGISTRATION FOR TRS-80® MICROCOMPUTER SHOW

May 21, 22, 23, 1981 — New York Statler Hotel

Name _____ Title _____

Company Name _____

Address _____

City, State, Zip _____

Please send _____ registrations at $10.00 each.

(Registration Badge will be sent to you on May 1st.)

Send To:
Kengore Corporation, Dept. 80 ✓230
3001 Route 27
Franklin Park, N.J. 08823

Co-sponsored By
80 microcomputing™

(Be sure to enclose check or money order.)

the UART to generate interrupts, nor is the interrupt line easily available to those who have time-critical applications. Interrupts are definitely usable on the TRS-80 (from your own machine language programs), since the vectors are stored in RAM. You must be careful, though, because many of the ROM routines depend on the interrupt vectors, and you may have to write your own keyboard and screen drivers depending on what interrupt mode you use.

Although a power supply is built in on the board (and it is quite a sophisticated one, too, using an additional Radio Shack TRS-80 transformer) I used one I already had, to save money and because my RS store refused to order the transformer for me. The completed board works with an external supply. It requires +5 volts at about 1A, +12V at a few mA, and −12V also at a few mA.

The manual is well written, and details are given for construction, configuring the system and theory of operation. Data sheets for the UART and the disk controller (1771) are included with software for using the 80 as a terminal. Software is also provided to drive a serial printer through the RS232 port, or through the parallel port, with certain board modifications. I only found one error in the chart of UART control addresses; the bits for Request to Send and for Data Terminal Ready are interchanged.

Construction went fairly well, but there were a few bugs that took several hours to find. Amazingly, these were all traced to a batch of new 100 ohm resistors, of which three were open.

One feature I didn't like was the vertically-mounted terminating resistors at the expansion bus.

Finally, everything worked, including the TRSDOS 2.3 memory test (TEST1) and stress test (TEST2).

Words of Warning

A few words of warning are in order. The bus expansion provided should be used with due caution. It is a simple, unbuffered extension of the TRS bus, and any expansion will require more buffering with high impedance input buffers (not 7400 IC's). Remove the terminating resistors from the LNW board and terminate at the end of your expansion, as well. There are two edge connectors on the board. Either should work with the keyboard, and the other may be used as the bus expansion. However, when I used the connector next to the terminating resistors for the keyboard, I had unusual problems like random rebooting, and incorrect operation of a few programs. Using the other connector cured the problem. I also suggest that you use the shortest cable possible. Incidentally, the cable does not come with the board, but you can make one with 40-conductor ribbon cable. The identical connectors on each end are 3M #3464-000. They are installed using a small vice.

Using disks, machine language programs can be patched to correct errors, and reassembled with ease. Data files are child's play, and of course, long programs load in seconds. My system has a KIM-1 converting from parallel to serial on the parallel printer port allowing me to use the KIM to format my output (paging, line length, margins, etc.). What is more, it has 4K of memory available to act as a buffer. When I LLIST a program less than 4K long, the READY returns in about one second!

I am using a Terminet 300 printer (upper and lowercase) at 300 baud. I use the RS232 port for packet radio transmission and reception at 2400 baud.

To summarize: the LNW Research board is well laid out and inexpensive. The documentation is satisfactory. With disk drives, 48K of memory and Electric Pencil with lowercase modification, it makes a good machine. ■

ADD DISK DRIVES TO YOUR MODEL III AND MODEL I

$599

Fully compatible with Radio Shack's operating system TRSDOS.

- One, two, three, four drive configurations.
- 134K to over 1 Meg of storage
- 40 track and 80 track available
- 90 day warranty, 100% parts and labor
- Extended warranty available

Complete upgrade includes one mini-disk drive, power supply, controller, and mounting hardware. IMMEDIATE DELIVERY.

	OUR PRICE	RADIO SHACK	SAVINGS
Complete one drive kit	$599.	$849.	29%
Additional internal drive	265.	399.	34%
External drive	299.	499.	32%
80 track drives (inc. patch) add	195. ea.	N/A	
16K memory (required to use drives)	49.	119.	59%
Model III 32K w/VR Data two drive assembly	1812.	2380.	24%
RS232 Adapter Board	75.	99.	25%

$299*

We've broken through the three hundred dollar barrier.

- Fully compatible with TRSDOS™
- Fully compatible with RS Drives
- Easy plug-in installation
- Rigid extender board
- 90 day warranty — 100% parts and labor
- Extended warranty available — $45/year
- Choice of Tandon or MPI drives
- * Includes power supply, enclosure, single sided — 40tk drive and **EXTENDER BOARD**

1 sided 80 tk - $419 2 sided 40tk - $419
2 sided 80tk - $549

MONTHLY SPECIALS

MX 80	$ 485
Microline 80	$ 425
NEC 5510 w/tractor	$2550

Published Prices Are Already Discounted For Cash.
VR Data, a manufacturer of innovative computer products, is known worldwide for quality, dependability and prompt, personal service since 1972.

VR Data corp

To order call toll free (800) 345-8102, or (215) 461-5300 in PA.

VR Data Corporation • 777 Henderson Boulevard • Folcroft, PA 19032

Verbatim Disks for TRS 80** at Lowest Prices with Free Hub Rings & Plastic Case Too!

Compare this offer on mini disks . . . then buy now and save!

(10 Pack — 5¼" Disks)

Generic Disks	$21.95	Others $24.95	Verbatim $27.95
Hub Ring	.60	.60	MD 525-01 Free
Case	3.95	3.95	Free
	$26.50	$29.50	$27.95

The quality facts about Verbatim Disks

- Certified 100% ERROR FREE
- It's the diskette preferred by *Apple and only one of two Apple-approved
- Factory-installed hub rings means . . . no loss of data due to damaged hub holes or loss of coating when hub hits disk

*A trademark of Apple Computer Inc
**A trademark of Tandy Corporation

✓59

LTD DATA INC.

Here's our Verbatim Offer —

MD 525-01 5¼" soft sectored MINI DISKS (includes factory-installed hub ring and a plastic storage case)

10 DISK Pack $27.95 ea.

Bonus — order 9 and get 10th for 99¢!

FD 34-8000 8" soft sectored DISKS (includes factory-installed hub ring in a hard box)

10 DISK Pack $43.95 ea.

Bonus — order 9 and get 10th for $14.95!

Add $2.50 per 10 Disk Pack for shipping and handling

— NOTE: Any excess shipping will be refunded

We accept check, money order, Visa or Master Charge. (With credit card orders, include card number and expiration date.)

C.O.D. shipments, $2.00 additional. Direct mail orders to LT-DATA INC. at either address below.

24 Hour Phone Order Line 1-303-575-8518

P.O. Box 1567, Wheat Ridge, Colorado 80033
Colorado Residents add 3% Sales Tax
P.O. Box 1017, Medina, Ohio 44258
Ohio Residents add 5½% Sales Tax

Final Opportunity . . . limited quantity of TDK cassettes still available (D-C60 & D-C90) See our April ad.

✓See List of Advertisers on page 306

Push and pop with blocks of BASIC code.

The Encoder

Ron Cain
Route 1, Box 190
Chancellor, AL 36316

You just finished writing a short asssembly language program for that flashy graphics display you want in your latest game program. Now, you have to convert all those machine language instructions in hex to decimal, and build them into data statements. You can then let your BASIC program poke the machine code into memory when it is run. By doing this, you eliminate the need to load both the machine language code and BASIC program in two separate steps. Good idea. But, what a job!

The Easy Way

Here is an easier way. Let the computer convert the hex machine instructions into a block of BASIC code which will POKE the hex codes back into memory at the proper addresses.

Program Encoder is written in BASIC, requires a minimum 16K, one disk system, and will generate the BASIC code (instructions and data statements) to POKE your machine code into memory.

Here's how it works. First, load your machine code to its proper location in reserved high memory. Then run Encoder. You will first be asked for the starting and ending addresses in memory where it can find the machine code.

These addresses can be in decimal (with or without a trailing D), or in hexadecimal (which must include the trailing H). Encoder then asks for the starting line number and increment to use in the BASIC code it produces.

Finally, you are asked for a filespec to store the code produced. The program then proceeds to create and write to the disk file a block of BASIC code to reproduce the machine instructions. Note that the code is stored on disk as if it had been SAVEd using the ASCII option, so that it can be merged with other BASIC programs.

Also, the code generated is in the form of a subroutine to the program, which is merged (since it contains the RETURN instruction). Take out the RETURN, and you can execute the routine in line.

So, next time you want to build a machine language program into your BASIC program, let Encoder do the work while you just do the thinking. ■

```
1 '*****************************************************
    ******
2 '*    PROGRAM NAME - ENCODER          VERSION 1.0
        *
3 '*      WRITTEN BY - R. L. CAIN
        *
4 '*                   BOOTSTRAP COMPUTER SERVICES
        *
5 '*                   CHANCELLOR,  ALABAMA  36316
        *
6 '*                   (205) 347-5206
        *
7 '*****************************************************
    ******
100 CLS: CLEAR 500: DEFINT A-Z
110 PRINT @13,"MACHINE LANGUAGE TO BASIC ENCODER": PRIN
    T: PRINT
120 '*
130 '* GET THE NECESSARY INPUT FOR THIS RUN *
140 '*--------------------------------------*
150 INPUT "STARTING ADDRESS"; A$
160 GOSUB 30050
170 IF ER=1 THEN 150
180 SA=A: SA!=A!
190 '*
200 INPUT "  ENDING ADDRESS"; A$
210 GOSUB 30050
220 IF ER=1 THEN 200
230 EA=A: EA!=A!
240 '*
250 IF EA!>SA! THEN 290
260 PRINT :PRINT "* END ADDRESS NOT > START ADDRESS *":
    PRINT
```

Program continues

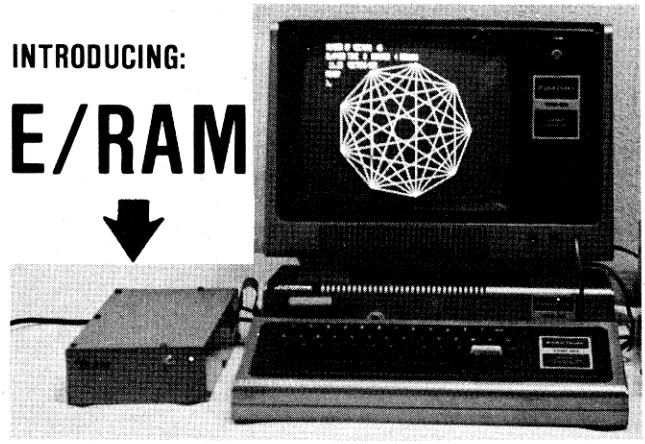
```
270 GOTO 150
280 '*
290 PRINT: INPUT "STARTING LINE NUMBER"; SL
300 INPUT "       LINE INCREMENT"; LI
310 '*
320 PRINT: LINE INPUT "FILESPEC FOR OUTPUT? "; FS$
1000 '*
1010 '*  OPEN THE FILE FOR OUTPUT, AND WRITE THE CODING
      TO POKE
1020 '*  THE MACHINE INSTRUCTIONS BACK INTO MEMORY.
1030 '*-----------------------------------------------
     -------*
1040 OPEN "O",1,FS$
1050 GOSUB 40050
1060 LN$=LN$ + "ZA% = " + STR$(SA)
1070 GOSUB 50040: GOSUB 40050
1080 LN$=LN$ + "FOR ZI! = " + STR$(SA!) + " TO " + STR$
     (EA!)
1090 GOSUB 50040: GOSUB 40050
1100 LN$=LN$ + "READ ZI%: POKE ZA%,ZI%"
1110 LN$=LN$+": IF ZA%=32767 THEN ZA%=-32768 ELSE ZA%=Z
     A%+1"
1120 GOSUB 50040: GOSUB 40050
1130 LN$=LN$ + "NEXT ZI!: RETURN"
1140 GOSUB 50040: GOSUB 40050
2000 '*
2010 '*  WE SET UP A FOR/NEXT LOOP TO PEEK EACH BYTE FR
     OM
2020 '*  MEMORY AND BUILD THEM AS DECIMAL INTEGERS INTO
2030 '*  DATA STATEMENTS.
2040 '*-----------------------------------------------
     ---*
2050 LN$=LN$+"DATA "
2060 FOR SA!=SA! TO EA!
2070 IF LEN(LN$) < 60 THEN 2110
2080 LN$=LEFT$(LN$,LEN(LN$)-1)
2090 GOSUB 50040: GOSUB 40050
2100 LN$=LN$+"DATA "
2110 A$=STR$(PEEK(SA)): A$=RIGHT$(A$,LEN(A$)-1)
2120 LN$=LN$+A$+","
2130 IF SA=32767 THEN SA=-32768 ELSE SA=SA+1
2140 NEXT SA!
2150 LN$=LEFT$(LN$,LEN(LN$)-1)
2160 GOSUB 50040
2170 CLOSE
2180 END
30000 '*
30010 '* THIS SUBROUTINE CONVERTS A NUMBER IN A$ TO A D
      ECIMAL
30020 '* VALUE. A$ CAN CONTAIN EITHER A HEX NUMBER (END
      S IN H)
30030 '* OR DECIMAL NUMBER (ENDS IN D OR A NUMBER).
30040 '*-----------------------------------------------
      -------*
30050 ER=0
30060 IF LEN(A$)=0 THEN ER=1: RETURN
30070 IF RIGHT$(A$,1)<>"D" THEN 30090
30080 A$=LEFT$(A$,LEN(A$)-1): GOTO 30100
30090 IF RIGHT$(A$,1)="H" THEN 30160
30100 FOR I=1 TO LEN(A$)
30110 K=ASC(MID$(A$,I,1))
30120 IF K<48 OR K>57 THEN ER=1: RETURN
30130 NEXT I
30140 A!=VAL(A$): IF A!>32767 THEN A=A!-65536 ELSE A=A!
30150 RETURN
30160 J!=1: A!=0
30170 FOR I=LEN(A$)-1 TO 1 STEP -1
30180 K = ASC(MID$(A$,I,1))
30190 IF K>47 AND K<58 THEN K=K-48: GOTO 30220
30200 IF K>64 AND K<71 THEN K=K-55: GOTO 30220
30210 ER=1: RETURN
30220 A!=A!+(J!*K)
30230 J!=J!*16
30240 NEXT I
30250 IF A!>32767 THEN A=A!-65536 ELSE A=A!
30260 RETURN
40000 '*
40010 '*  THIS SUBROUTINE INITIALIZES EACH LINE OF CODE
      TO BE
40020 '*  OUTPUT WITH ITS LINE NUMBER MAKING IT READY F
      OR THE
40030 '*  ADDITION OF THE BASIC INSTRUCTIONS OR DATA.
40040 '*-----------------------------------------------
      -------*
40050 PRINT "CREATING LINE";SL,
40060 LN$=RIGHT$(STR$(SL),LEN(STR$(SL))-1) + " "
40070 RETURN
50000 '*
50010 '*  THIS SUBROUTINE WRITES EACH LINE OF CODE CREA
      TED TO
50020 '*  THE DISK FILE, AND THEN INCREMENTS THE LINE N
      UMBER.
50030 '*-----------------------------------------------
      -------*
50040 PRINT "WRITING LINE";SL: PRINT#1, LN$
50050 SL=SL+LI
50060 RETURN
```

Program Listing for Encoder

HI-RESOLUTION GRAPHICS FOR TRS-80*

INTRODUCING:

E/RAM



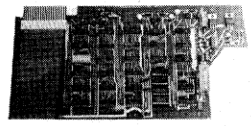
E/RAM Graphics is a unique hardware/software package, which will integrate high-speed, high resolution graphics into any Level II TRS-80 system. E/RAM hardware is a fully plug-compatible box, which installs in minutes, and requires absolutely **no** modifications to the TRS-80 system. E/RAM software is a compact, relocatable set of utilities which provides the user with easily accessible graphics functions. For instance: the user pokes the end point coordinates of a line into certain locations, does a USR call, and an optimized dot-raster line is automatically drawn on the screen at very high speed (less than 10 milli-seconds for a medium length line).

E/RAM does not require the purchase of an additional monitor CRT. The high-resolution graphics video is syncronized with the TRS-80 video and appears on the screen with the normal TRS-80 display. Alphanumerics, TRS-80 graphics, and E/RAM high-resolution graphics may be displayed simultaneously or individually.

E/RAM hardware contains its own 6144 byte video memory, which provides a true 256 x 192 matrix of **independent** graphic elements. (E/RAM is **NOT** a programmable character generator type graphics system. Character generator systems have serious limitations in full screen graphics applications.)

E/RAM will operate with or without an expansion interface, and with any standard memory configuration (4k through 48k).

E/RAM is **fast**. "E/RAM" is an acronym for **E**xtended **R**andom **A**ccess **M**emory, a very short description of the Patent-Pending method of I/O employed by this device, which gives it memory-mapped speed without interfering with the memory space used by the TRS-80.



The installation of E/RAM will not affect normal operation of the TRS-80. High resolution ON/OFF is under program or manual control (a switch is provided). An expansion card edge connector is provided so that other peripherals may be used on the TRS-80 bus.

E/RAM software package is compact (less than 1000 bytes), fast, easy to use, and very flexible. A relocating loader is provided. The user can delete unneeded routines if more memory space is required. Lines can be drawn as fast as 13 per second using BASIC USR calls, and as fast as 200 per second using assembly language programs.

Routines usable through USR of BASIC, and of course an assembler CALL are:

INIT	-	Sets up display
PLOT	-	Plots a point
READ	-	Reads a point from the screen
BLACK	-	Sets drawing mode to black (off)
WHITE	-	Sets drawing mode to on
CLEAR	-	Clears the high-resolution graphics screen
LINE	-	Draws a line

As an example, after the utilities package is loaded and you desire to draw a line, the following sequence of BASIC instructions could be executed:

U=USR(0)	Return the communications area
POKE U+1,X0	Provide the beginning X coordinate
POKE U+3,Y0	Provide the beginning Y coordinate
POKE U+5,X1	Provide the ending X coordinate
POKE U+7,Y1	Provide the ending Y coordinate
V=USR(4)	Draw the line (Current speed is approximately 13 vectors/second)

The complete E/RAM package is available for only $349.95, and includes case, power supply, cables, software cassette, and complete documentation.

To order, or for further details, write or call:

VERN STREET PRODUCTS THE COMPUTER STORE

We handle a full line of Radio Shack products ✓432

4949 South Peoria Ave
Tulsa, Okla 74105
(918) 747-2550

Send $10.00 for a set of the manuals provided (applicable towards purchase)
Dealer inquiries are invited.
Terms: COD Welcome, check, money order, Master Charge, or Visa
Delivery: Stock to 60 days.
E/RAM was designed, and is manufactured by KEYLINE COMPUTER PRODUCTS, INC. 13 East 6th Street, M/C 200, Tulsa, Oklahoma 74119.

*TRS-80 is a registered trademark of Radio Shack, a Tandy Corporation.

✓See List of Advertisers on page 306

Ride herd on your cassette voltage levels and interface with the world.

The Pulse Jockey

Larry Suter
1643 Warsaw Ave.
Livermore, CA 94550

How would you like to have a cheap and simple way to hook your TRS-80 to the outside world? A way that uses software and trickery to side-step complicated hardware? One that doesn't involve ribbon cables, expansion connections, p.c. boards or expensive chips?

For $5 and an evening's effort you can take this hardware/software route to interfacing.

We'll use serial I/O through the cassette port and some simple hardware for our interface. Because the hardware is so simple, we'll have to augment it with short algorithms written in Level II BASIC. For faster I/O we'll use machine language algorithms. But this can be done painlessly, and I'll show you how.

Essential Point

The key to this approach is that you can get two independent sources of pulses from your cassette output plug. Let's first see how the cassette output actually produces three software selectable output voltages. Then we'll understand how these three voltage levels can be used to generate the two independent channels of pulses.

Let's experiment. Hook a voltmeter across the cassette output plug (the grey one which goes into AUX). Run the program:

```
10 INPUT N:OUT 255, N:GOTO 10
```

When you input N as O you'll measure about 0.45-V output. What you've done with this program is to send a 0 to port 255. (255 is the cassette port's i.d. number.) Sending a 0 to port 255 results in 0.45-V output.

Next, input N as 1. You'll find that sending one to port 255 results in 0.9V output.

Finally, input a two. Sending two to port 255 results in 0V output. You'll see that your TRS-80 actually puts out three voltage levels—0.45V, 0.9V or 0V, depending on whether you send a 0, 1 or 2 port 255. These three software selectable voltage levels provide the key to interfacing through the cassette port. They can be used to generate two channels of output pulses.

Fig. 1 shows how you get two output channels from three voltage levels. Normally the cassette output level is 0.45V. When you issue the command: OUT 225, 1:OUT 255, 0, the output rises to 0.9V and drops back to 0.45V. You can generate a logic compatible pulse by connecting the cassette output plug to a comparitor, which produces a one when its input is greater than 0.7V. We'll call the output of this comparitor Pulse 1 since it's actuated by sending a one to port 255.

If you send out an OUT 255,2:OUT 255,0 you won't get PULSE 1 since the voltage is always less than the comparitor's threshold. But, you will get a pulse from a comparitor which has a threshold of 0.35V. We'll call this second output Pulse 2. That's how you get two channels out of one plug. Three voltage levels and two comparitors.

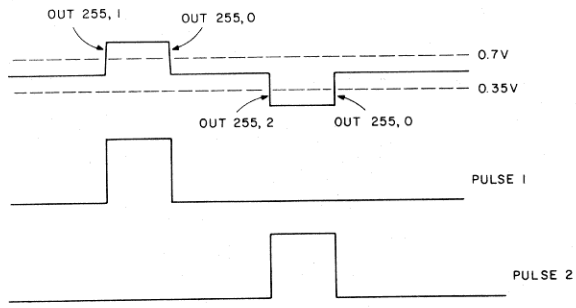


Fig. 1. Your cassette output plug produces three software controllable voltage levels. Two comparitors will convert these levels into two independent sources of logic pulses, Pulse 1 and Pulse 2.

1- 10K resistor
2- 5K resistors
2- 1K resistors
3- 1N34A Germanium diodes
1- 0.01 microfarad capacitor
2- 0.047 microfarad capacitors
1- 10. microfarad electrolytic capacitor
1- 339 quad comparitor
1- 74154 1:16 multiplexer
1- 7493 counter
1- 74151 8:1 demultiplexer
2- miniature phone jacks
1- bread board

In addition to these parts you'll want chips such as 74157 quad latches, more 7493 counters and 7404 inverters, to let you make parallel output ports.

Parts List

"You've all seen the ads,"

"...the ones promising to make your computer as powerful as a small tornado in only 6K. Well, there's a new tornado out now called Enhanced BASIC (ENHBAS). From Cornsoft, this...BASIC really does give your system some incredible capabilities." "As an editor who has used Level I, II, III, Microsoft BASIC, with and without Apparat alterations, I have finally found my BASIC."

"If you're after more power than you've ever seen before, 'ENHBAS' is a great bargain."

Phillip Case,
Soft Side Magazine

ENHBAS gives your BASIC more capabilities

TRS 80†Model I & III ENHBAS actual new commands and functions include:

SORT - SORT all KEYed and TAGed arrays simultaneously, sorts 1000 strings in approx. 15 sec.
JNAME - Identifies a label for use by GTO and CSUB
GTO - Allows labeled GOTO and calculated GOTO's
CSUB - Like GTO except does GOSUB
PLOT - Sets/resets a line/box between two points
EVAL - Evaluates a string expression as an algebraic expression
DRAW - Uses an integer array to draw turtle graphics
PLAY - Uses a string variable to play a user defined set of notes over the cassette port.
EXEC - EXECutes string expression as a BASIC program statement
SCROLL - Sets lines at top of screen to be scroll protected
and many more

Background Capabilities:

Key Click
Tone on Error
Custom Cursor
Columnized LISTings
Shorthand Entry of Commands
plus many more

TRS 80† Model II ENHBAS includes many of the instructions of Model I & III ENHBAS plus special instructions to allow free style fielding like NEWDOS-80‡ (allows record lengths up to 32,767 bytes long). PLUS - many file handling commands, and special string functions to read disc ID's and read from the screen. In addition, Model II ENHBAS allows you to use indexed files, scroll protection, RS232 communication, ON, BREAK, GOTO, POKE, PEEK, redifineable cursor and many more functions.

†trademark of the Tandy Corp. ‡trademark of Apparat, Inc.

NAME _____

ADDRESS _____

_____

_____

MASTERCARD #
(include Interbank # and expiration date)

_____

_____

Dealer inquiries invited.
Include payment or credit card number with each order.
All foreign orders must be paid in U.S. dollars.

☐ **Yes.** Please send _____ copy(ies) of ENHBAS

_____ Model I & III @ $59.95 ea. _____ Model II @ $99.95 ea.

Please specify: _____ Disk _____ Cassette

☐ Send more information about ENHBAS.

☐ Send information about business programs that run under ENHBAS.

The Cornsoft Group ✓465
6008 N. Keystone Ave., Indianapolis, IN 46220
(317) 257-3227

✓See List of Advertisers on page 306

By happenstance, the TRS-80 cassette plug can actually give two channels of pulses. What are the benefits of two pulse sources? Two pulse sources allow you to use one pulse to route the other pulse wherever you want it.

Fig. 2 shows how this is done. Pulse 1 goes into a counter. The output of the counter is connected to the address pins of a multiplexer chip. What this chip does is to route its one input signal (Pulse 2!) to any of its output pins. Which output is hooked up the Pulse 2 is determined by the four address pins connected to the counter.

For example, let's say that you want to send out 10 pulses to pin 7. First you issue seven Pulse 1s which cause the counter to put out a 0111 bit pattern. This pattern causes output pin 7 of the multiplexer to be connected to Pulse 2. Now send out 10 Pulse 2s and they will end up where you want them.

What if you want parallel output? Fig. 2 also indicates how you can do this with a separate counter. One of the multiplexer's outputs is connected to the reset pin on the counter, and another to its clock input. By first clearing the counter and then sending out N pulses you can get any output. You can get many parallel outputs by connecting latches to the counter's output and using other pulses from the multiplexer to latch the data.

Is it possible to do half as much with just one pulse source? Possibly, but it would require pulse length modulation or some other tricks. It's a lot easier to do it this way.

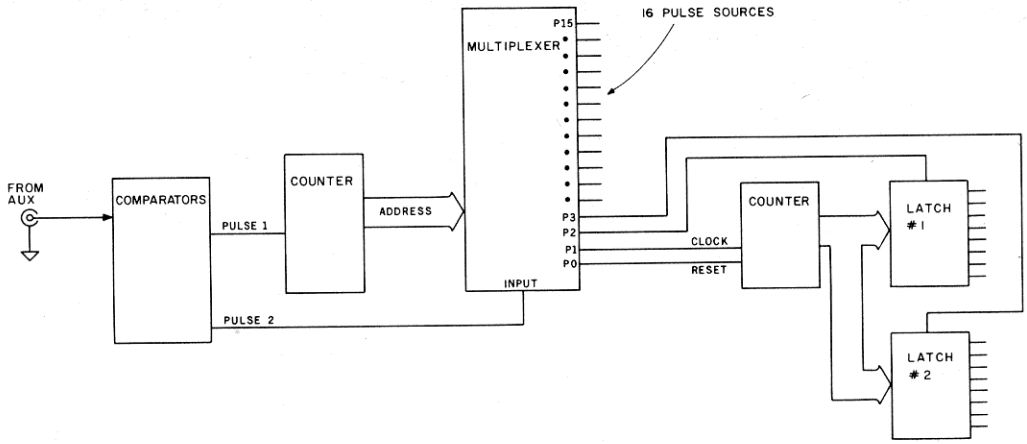


Fig. 2. Pulse 1 and Pulse 2 can generate as many independent pulses as you need. The idea is that Pulse 1 routes Pulse 2 wherever you want. You get steady, parallel outputs by using the pulses to drive counters and latches.

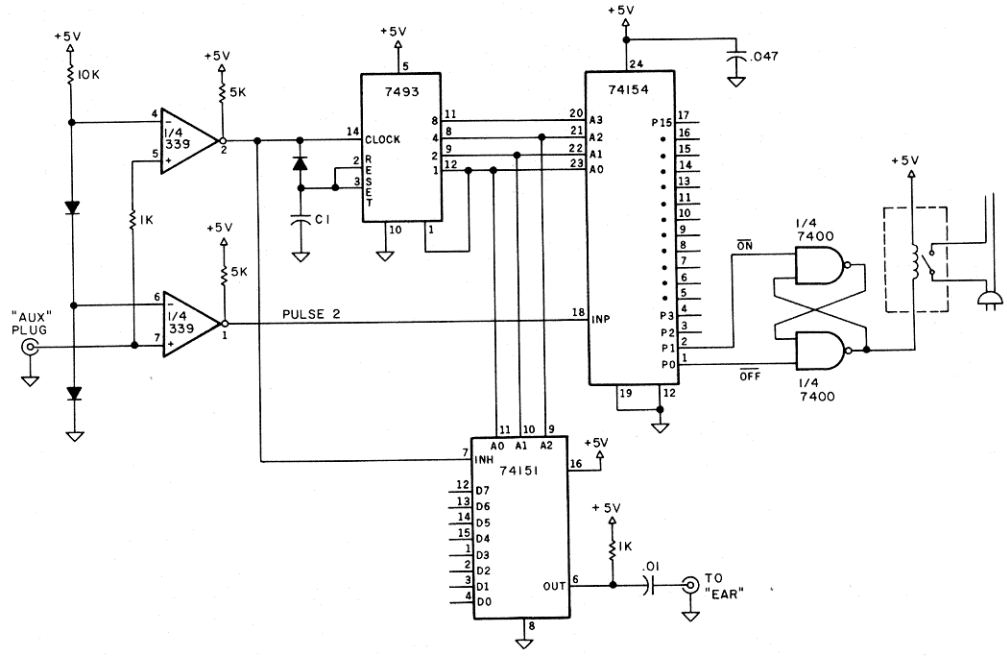


Fig. 3. Circuit for the I/O port. The upper three chips form the output port. Adding the 74151 will give you input as well. The port is shown driving a relay via a flip-flop.

Hardware

The circuit I use to do this kind of pulse jockeying is shown in Fig. 3. The 339 comparitors, which are the heart of this scheme, must be properly biased. One at 0.35V and the other at 0.7V. Use germanium diodes to do this since they provide a voltage drop of 0.3 to 0.5V, depending on their current. The way the inputs are hooked up, Pulse 1 (the router) is normally low. Pulse 2 (the routee) is normally high.

Since the 7493 counter is hooked up to Pulse 1, it gets incremented every time you send out an OUT 255,1:OUT 255,0. By sending out the right number of pulses you can hook Pulse 2 up to any one of the multiplexer's outputs.

If you want to hook up pin 7 to Pulse 2, then you can do it by sending out seven Pulse 1s—if the counter was zero when you started. To make sure you've started at zero, the circuit of Fig.

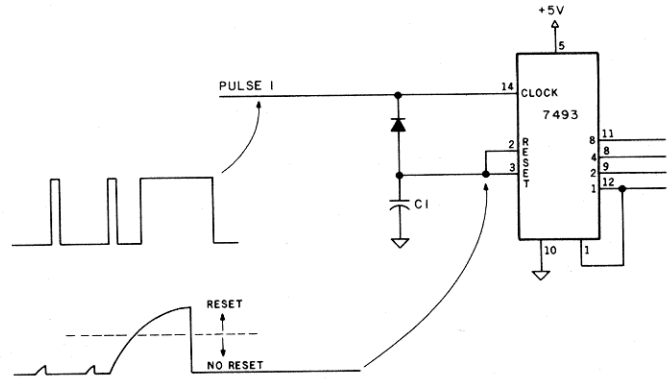


Fig. 4. The diode and capacitor allow you to zero the 7493 counter with a long Pulse 1s and increase it with short Pulse 1s.

MODEL II

26-4002
64K 1 Drive
$3440.00

26-4160 1 Drive Exp. $1034.00
26-4161 2 Drive Exp. 1574.00
26-4162 3 Drive Exp. 2114.00
26-4530 Scripsit II. 265.00
26-4512 Profile II. 162.00
26-4511 Visicalc II. 265.00
26-4501 Gen Ledger. 180.00
26-4506 Mail List. 72.00

PRINTERS

CENTRONICS

BEST PRICES

Fast 100 CPS Centronics
730-1A Printer. $577.00
Text Quality Centronics
737-1 Printer. $737.00

$ DISCOUNT $

TRS-80®

DEALER A301

COMPUTER SPECIALISTS

CALL US. . . SAVE MONEY

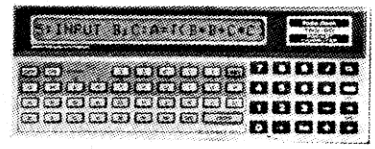
We carry the full line of TRS-80 Computers. All other R.S. software, furniture, and accessories at discount from catalog price. We stock most items to assure you fast delivery and save you money.

26-1140 Expansion Interface. $249.00
26-1141 16K Exp. Interface. 359.00
26-1142 32K Exp. INterface. 469.00
26-1145 RS232C Board. 84.00
26-1160/1 Mini Disk Drive. 419.00
26-1563 Scripsit-Disk. 79.00
26-1566 Visicalc. 83.00

* * * * * * **PRINTERS** * * * * * *

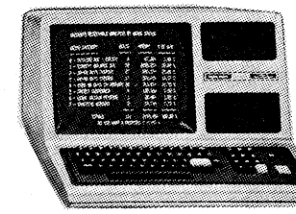
26-1155 Quick Printer. 187.00
26-1167 9½ Dot Matrix Printer. 360.00
26-1166 Line Printer VI. 1080.00
26-1158 Daisy Wheel II. 1799.00
26-1165 Line Printer V. 1710.00

Pocket Computer



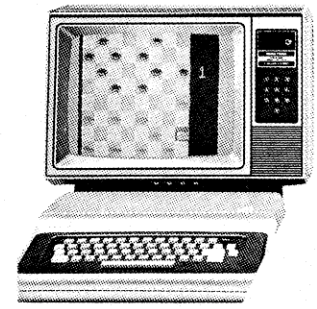
26-3501 1.9K P.C. $221.00
26-3503 Cassette IF. 45.00
14-812 Recorder. 72.00

MODEL III



26-1061 4K I. $629.00
26-1062 16K III. 865.00
26-1063 32K III
W/2 Drives, RS232. . . . . 2225.00

COLOR



26-3001 4K. $353.00
26-3002 16K Ext. Basic. 533.00
26-3008 Joysticks. 22.50
26-3010 Color Video. 353.00
26-1206 Recorder. 54.00

commodore

AUTHORIZED DEALER
CALL FOR PRICES

ALL POCKET AND COLOR COMPUTER SOFTWARE SOLD AT DISCOUNT

WRITE US FOR A
FREE CATALOG

1-800-841-0860 Toll Free Order Entry

MICRO MANAGEMENT SYSTEMS, INC.

✓72

No Taxes on Out Of State Shipments

Immediate Shipment From Stock on Most Items

DOWNTOWN PLAZA SHOPPING CENTER
115 C. SECOND AVE. S.W.
CAIRO, GEORGIA 31728
(912) 377-7120 Ga. Phone No. & Export

TRS-80 is a registered trademark of the Tandy Corp.

R.S. 90 Day Limited Warranty
F-48 Form Provided

Largest Inventory In The S.E. U.S.A.

✓See List of Advertisers on page 306

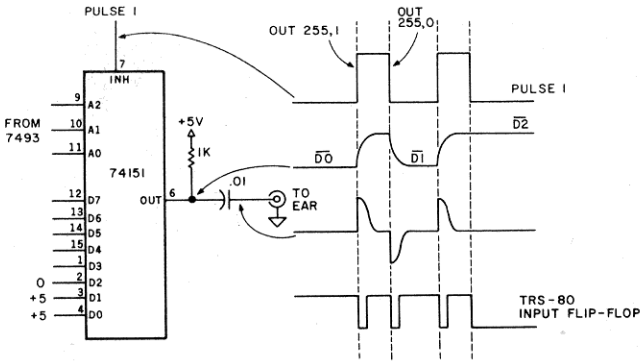


Fig. 5. Every Pulse 1 initiates a chain of events which loads a data bit into your TRS-80's input flip-flop.

```
                CALL OA7F       M of USR(M)9HL
                LD A,O1H
                OUT FFH         Clear 7498
                XOR A           with long
                LD B,A          PULSE1
                DJNZ, FE
                OUT FF

                BIT 7H
                                IF HL<O GOTO INPUT
                JR NZ, INPUT

                LD DO1H
                LD E,H          Send out H PULSE1's
                CALL PULSE

                LD D,O2
                LD E,L          Send out L PULSE2's
                CALL PULSE

                RET

PULSE           INC E
LOOP            DEC E
                RET Z           Send pulses to cassette port
                LD A,D          D = type (1 or 2)
                OUT FFH         E = how many
                XOR A
                OUT FF
                JR, LOOP

INPUT           LD C,A          O9C
                LD B,O8H        B = # of bits to input
LOOP2           CALL DELAY
                SRL C           C = 2*C
                IN FF
                AND 80H         IF INP(225)>127 0 THEN C = C + 128
                ADD C           ELSE C = C + O
                LD C, A
                LD A,01H
                OUT FFH
                XOR A           Send out PULSE1
                CALL DELAY
                OUT FFH
                DJNZ, LOOP2
                LD, L, C
                                C9HL
                LD H,OOH
                                HL9USR(N)
                JP OA9AH
DELAY RET
```

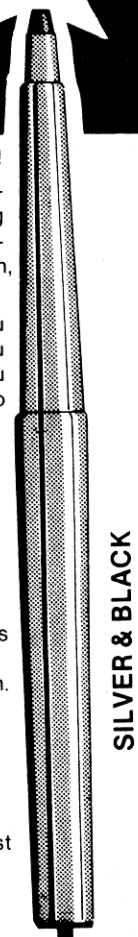
Table 1. Assembly language listing of the machine language I/O program you load with Program Listing 3.

3 will let you zero the counter by sending a long Pulse 1. Before looking at Fig. 4 which explains how this zeroing is done, you'll

The Original "Photo point" Light Pen™

ONLY $19.95

Why pay $30.00, $35.00, $62.00 for the same results??



Don't be misled by more expensive imitations!

This is the **original** *Photo point* light pen preferred and supported by some of the leading software sources like, "Quality Software"—"Instant Software"—"Level IV" products and so on,

Just imagine . . .

In playing backgammon, (included) when you want to move a man, you just point at where you want to move from, then point at where you want to move to, and your man moves!!! No more fumbling with keyboards—YEA!

Your Photo Point package comes complete;

- 1 Photo point light pen (of course)
- Info sheets on how to connect the pen and how to write your own programs ALL IN BASIC
- Two apertures
- AND two sensitivity settings
- A cassette tape with 4 informative programs and games
- Ready to connect to your TRS-80 System. **(DOS too!)**
- Does not void any Radio Shack warranties

Requirements:

- Level II basic
- And a little *imagination!!*

For fast real time programming it is your lowest cost peripheral at $19.95

Announcing

NEW PEN BASIC by Steve Bjork

Steve is one of the Best Assembly Lang. programmers around, and he has come up with PEN BASIC. This low memory routine will add 10 more commands to Level II such as PENGET which searches the entire screen for the pen and returns a number between 0-1024 in about 1 sec. Plus 9 other commands. Perfect for you lightware authors and **NEW** light pen owners too! . . . . . .only $14.95

(COUPON)

Micro Matrix ✓68
P.O. Box 938 • Pacifica, CA 94044
Send for yours **NOW:** **(415) 355-4635**

Name _____ Photopoint ☐ $19.95

Address _____

City _____ St. _____ Pen Basic ☐ $14.95

Zip _____

Card # _____ Ex. Date _____ CK. ☐ Money Order ☐ Visa ☐ MC ☐

need one essential fact. That fact is that when a TTL input is low it has about 1ma of current trickling out of it.

To zero this counter with a long Pulse 1 you can use the instruction:

```
OUT 244, 1:FOR I = 1TO20:NEXT:OUT 255,0
```

Program Listing 1 is the BASIC listing of a subroutine for sending out N pulses to pin P. First we zero the counter. Then we send P Pulse 1s followed by N Pulse 2s. That's all there is to it!

C1 of Fig. 3 & 4 must be 10 microfarads when using this BASIC algorithm.

Machine Language Algorithm

Program Listing 3 is a small Level II BASIC routine which will load a machine language form of the output, add input algorithims into memory. It will also set up the appropriate TRS-80 pointers so you jump to the routine whenever you issue an X = USR(N) command. The machine language program is contained in the DATA statement so be sure to get it right.

Table 1 is an annotated assembly language listing of the machine language I/O algorithm. One thing needs explaining. The calls to subroutine DELAY when doing input are needed to chew up about 15 microseconds. Apparently the TRS-80 cassette input amplifier isn't fast enough to respond to the very quick pulses which would result without the delay.

Great for Beginners

If you have little or no experience with digital electronics then this is the project for you. You can put the circuit of Fig. 3 together one chip at a time. Every chip is a milestone. An individual accomplishment.

First get the comparitor working to generate Pulse 1 and Pulse 2. Use a voltmeter to diagnose the circuit.

Then hook Pulse 1 up to the 7493 counter and practice incrementing and zeroing it. You can also check this action with your voltmeter.

Next comes the 74154 multiplexer. But don't stop your digital education here. Hook up counters, inverters and latches to the output pulses. Once you have parallel outputs your computer and output port form the basis of a digital lab. You can see this system to study the operation of just about any digital chip. And they're not hard to set up on a breadboard.

Where can you get more information about digital electronics? Well one good source is Lancaster's TTL Cookbook. It's full of information about chips and techniques. And is presented in a way that allows you to skip around.■

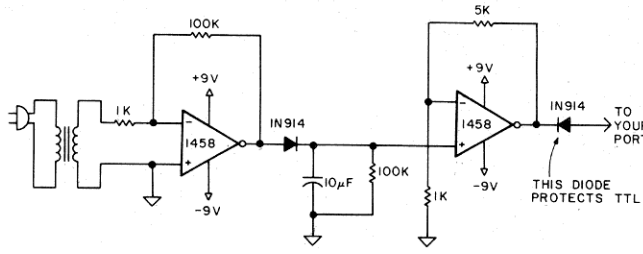


Fig. 6. This handy transducer tells whether an appliance is on or off. AC current will induce a signal in the pick-up loop which gets amplified and rectified to a TTL compatible level. The output is connected to one of the input pins of your port.

```
10 FOR I=0 TO 73:READ A:POKE 20224+I,A:NEXT
20 POKE 16526,0:POKE 16527,79
25 DATA 205,127,10,62,1,211,255,175,71,16,254,211,255,2
     03,124,32,24,22,1,92,205,30,79,22,2,93,205,30,79,2
     01,28,29,200,122,211,255,175,211,255,24,246,0079,6
     ,8,205,73,79
26 DATA 203,57,219,255,230,128,129,0079,62,1,211,255,20
     5,73,79,175,211,255,16,233,105,38,0,195,154,10,201
```

Program Listing 1. This BASIC algorithm sends output pulses to pin P of the 74154 of Fig. 3. C1 of Figure 3 must be 10 microfarads when using this algorithm.

```
2990 REM CLEAR 7493 WITH A LONG PULSE1
3000 OUT 255,1:FOR I=1 TO 30:NEXT:OUT 255,0
3005 REM SELECT OUTPUT PIN WITH P PULSE1'S
3010 IF P>0 THEN FOR I=1 TO P:OUT 255,1:OUT 255,0:NEXT
3015 REM SEND N PULSES TO SELECTED OUTPUT PIN
3020 IF N>O THEN FOR I=1 TO N:OUT 255,2:OUT 255,0:NEXT
3030 RETURN
```

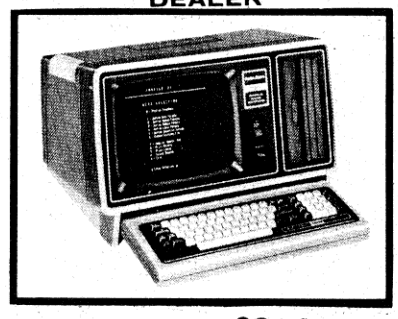
Program Listing 2. When you call this BASIC subroutine, you'll get back C, the decimal equivalent of the input to the 74151 chip.

```
1990 REM CLEAR 7493 WITH A LONG PULSE1
2000 OUT 255,1:FOR I=1 TO 30:NEXT:OUT8255,0
2005 REM READ IN D0-D7. CONVERT THIS BIT PATTERN TO DEC
     IMAL          NUMBER C.
2010 C=0:FOR I=0 TO 7:IF INP(255)>127 THEN C=C+2[I
2020 OUT 255,1:OUT 255,0:NEXT:RETURN
```

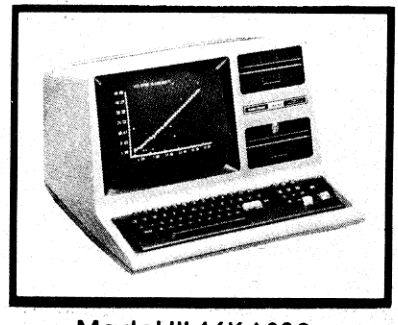
Program Listing 3.

If you're looking for the best prices

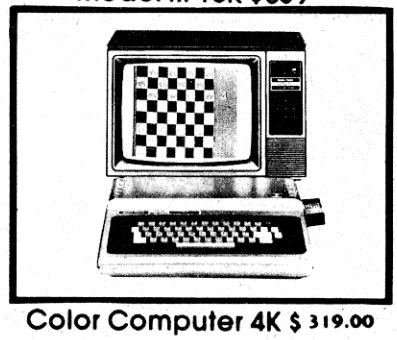
Radio Shack DEALER



Model II 64K $ 3298



Model III 16K $839



Color Computer 4K $ 319.00

Other TRS-80 Model II, or Model III computers and systems, Color Computers, and Pocket Computers are in stock at similar savings.

Check out our low, low prices on all Radio Shack merchandise

WRITE OR CALL FOR OUR COMPLETE PRICE LIST.

full Radio Shack warranty

★ Payment: Money Order, Cashier's Check, Certified Check. Personal Checks require 3 weeks to clear. VISA, MASTERCHARGE — Add 3%.

★ Prices subject to change at any time.

CALL (602) 458-2477

or write today

RAND'S ✓236

2185 E. FRY BLVD.

SIERRA VISTA, AZ 85635

✓See List of Advertisers on page 306

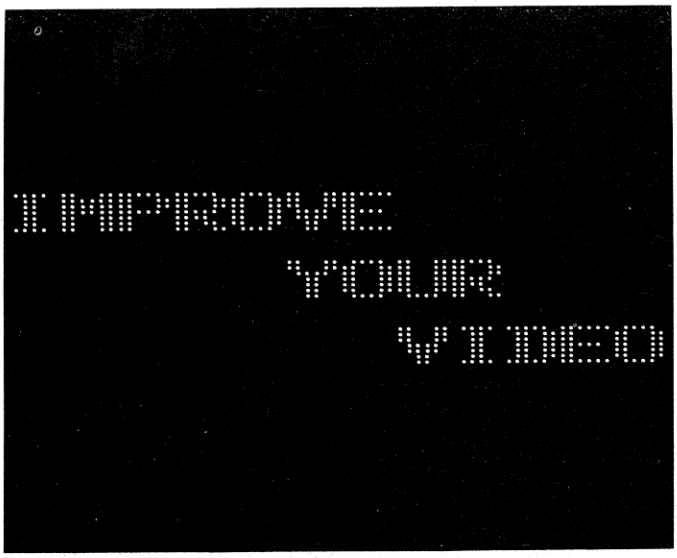


Photo 1

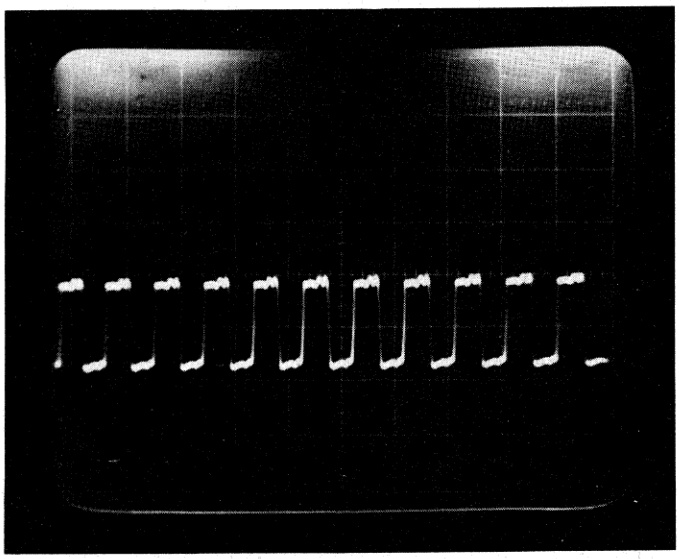


Photo 2

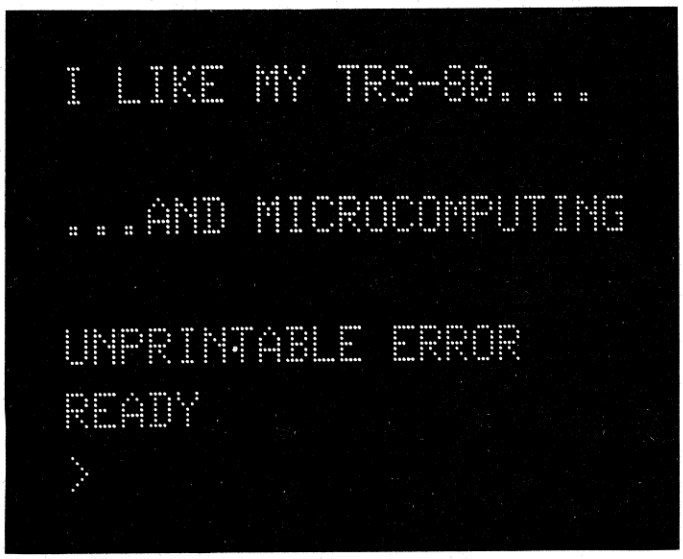


Photo 3

Shows you how to use two free video pins.

>22MHz For $99

Fredi Egger
Grundstrasse 21
CH-8500 Frauenfeld
Switzerland

Everyone owning a TRS-80 seems to agree that the cassette recorder is the weak point of the whole line. A lot of articles have been published in order to help people to get rid of these problems. I personally consider the Data Dubber, published in Jan. and Feb., 1980 of *80 Microcomputing*, to be the most reliable cure. There is nothing to be added—it just works perfectly.

In my opinion the TRS-80 monitor takes second place for being problematic. I tried hard to improve the display. I followed the hints in *Kilobaud Microcomputing* (Dec., 1979, "Peak Your TRS-80 Display") and *80 Microcomputing* (Feb., 1980, "Video Tune-Up"). But I was not quite satisfied.

Finally I decided to go for another monitor—without spending much money. I looked through the relevant magazines and discovered an ad announcing a monitor with a bandwidth of less than 22 MHz for only $99 from Electravalue Industrial.

The ASL-monitor came in perfect condition and was accompanied by fairly good documentation. They even enclosed an extra sheet with suggestions on how to connect it to the TRS-80. Since the monitor does not have a mixed video input one has to bring the horizontal and the vertical sync signals out of the TRS-80. TRS-80 designers left two of the five pins of the video-DIN connector free.

Following the instructions supplied with the monitor, the horizontal sync pulses are taken from Z6, pin 6, and brought to the DIN connector, pin 2. Similarly, the vertical syncs from Z57, pin 8, go to DIN, pin 3 in Fig. 1.

There is one problem: Due to a phase jitter between the horizontal and vertical sync pulses produced by the TRS-80, the displayed dots jitter randomly.

The jitter disappears by adjusting the horizontal position potentiometer (R20 in Fig. 1) to move the display to the right side of the screen. But you will be able to use only the right half of the screen.

Fortunately, there is a simple way to fix this. Instead of pro-

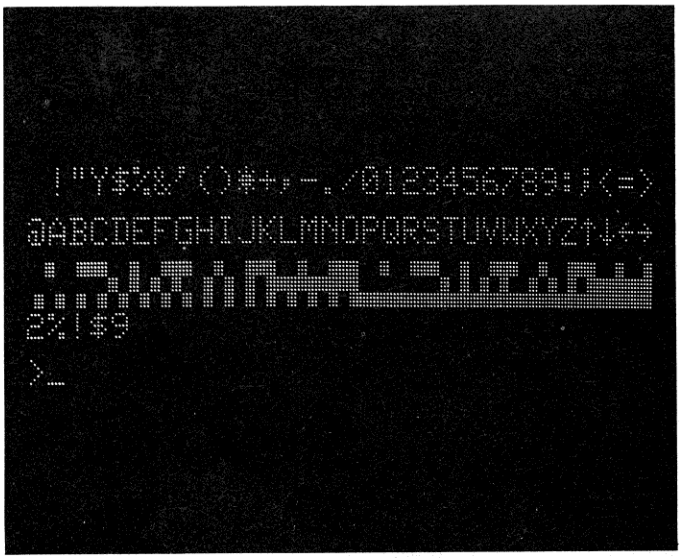


Photo 4

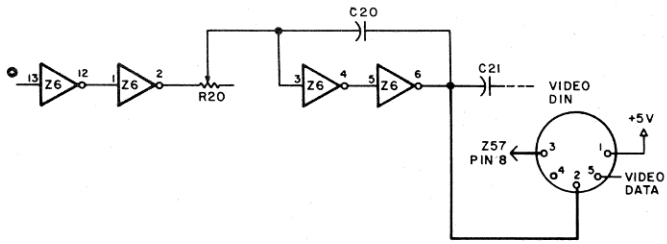


Fig. 1

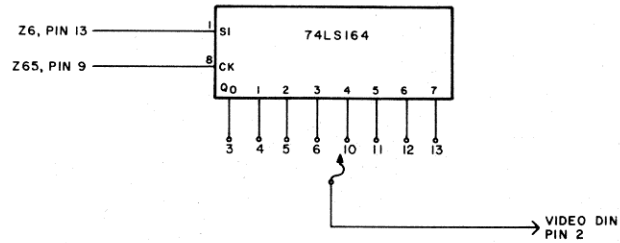


Fig. 2

ducing the horizontal sync delay with a CR network (C20 and R20 in Fig. 1), use a shift register as shown in Fig. 2. The 74LS164 is piggybacked onto Z7 (taking +5 volts from pin 14 and ground from pin 7). All the other pins are bent outward. Connect the serial input to Z6, pin 13, and the clock input to Z65, pin 9. At this point the frequency is 443.52 KHz which gives us a clock width of 2.25 microseconds.

Then digitally adjust the horizontal position at the beginning of the character lines following Table 1. I found pin 10 the most convenient. All other pins of the 164 are unused.

A bandwidth of 22 MHz gives us a chance for more improvements. Consider the letter Z in the MEMORY SIZE question. You will notice that the top and bottom bar appear much brighter on the screen than the single dots forming the diagonal line. When there is more than one dot in a row of the shift registers (Z10 and Z11), the display will be brighter than the single dots. Look at the E and Z in Fig. 3.

There is an easy way to get rid of that. In the TRS-80 the parallel-serial-conversion of character and graphics slices takes place in two shift registers (Z10 and Z11). The serial outputs of these ICs are NORed in Z30 (pins 2 and 3). At the output of this gate (point A in Fig. 3) a logical 0 means a white spot on the video screen. Correspondingly, a 1 creates a screen blank.

If we now insert a gate (one of the spare 74LS32 gates in the TRS-80) between Z30, pin 1, Z41, pins 6 and 7 (as shown in Fig. 3), we can control the video output by applying an appropriate signal to the second input of this gate. At Z9, pin 8, we find the clock signal for the two shift registers in Photo 2. Connect this to the inserted gate, and you get the display shown in Photo 3.

In fact, I used one-half of a 74LS123-monoflop. It seemed to give better results than a simple OR gate. The 123 was piggybacked onto Z10 and wired up as shown in Fig. 4. In this application we are using the two bottom lines of the monoflop's truth table. The monoflop is initially fired by the low-going edge of the signal coming from the shift registers. About 50 nanoseconds later, it is reset by the low-going clock signal. If the shift register signal stays low, the astable will be fired again by the high-going edge of the clock signal (another 50 nanoseconds later).

We can paint 73720 (64 characters * 6 dots * 16 rows * 12 scanlines) distinct points in a 384*192 matrix on our screen. If we only had the hardware (memory) and the software to control them. . . But don't you think it is a promising start to high resolution graphics? ■

Hor Sync Output	Line Locations
pin 3	about center of screen
4	↓
5	moving toward the left
6	in half-inch steps
	(2.25 microseconds/step)
10	↓
11	
12	
13	leftmost position

Table 1. If the horizontal sync output is connected to a pin designated in the left column, the position beginning the line is indicated in the right column.

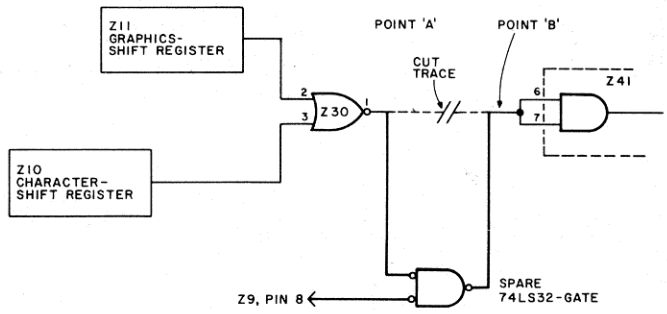
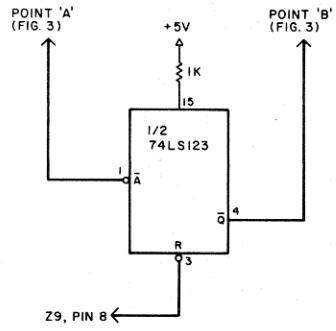


Fig. 3



123

FUNCTION TABLE

INPUTS			OUTPUTS	
CLEAR	A	B	Q	$\bar{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
M	L	I	⎍	⎍
H	I	M	⎍	⎍
I	L	M	⎍	⎍

Fig. 4

A calculator based utility that takes the hex off number base conversions.

Hex Converter

Richard H. Malone
82 Garden Drive
Albertson, NY 11507

One of the most difficult prerequisites of assembly language programming is learning the hexadecimal number system. If you're like me, accustomed to BASIC where all references to memory locations and constants are in decimal, your first exposure to machine language programming can be a nightmare of hex to decimal/decimal to hex conversion tables and reams of scribbled notes.

Of course many conversion programs are available to you, but when you're deep into a machine language problem, your computer is tied up and you must resort to good old paper and pencil.

A better solution is to perform the necessary calculations on your hand calculator or a programmable one.

Number Systems

Let's review the relationship between the decimal and hexadecimal number systems.

The basis of the hexadecimal system is easy to understand. Each character position in a number has a value determined by two factors:

- the value of the character occupying the position;
- the value of the particular position.

These two factors are multiplied to determine the value for that position and the value for all positions is added to determine the value of the entire number.

In the decimal system there are ten possible characters to occupy each position (0–9). In the hexadecimal system there are sixteen possible characters to occupy each position (0–9 and A–F).

In any number system the value of a particular position is equal to the base of the system raised to a power equal to the number of positions to the left of the decimal point, minus one. Thus in the decimal system (base 10), the value of each position to the left of the decimal point is:

10^4	10^3	10^2	10^1	10^0
10000	1000	100	10	1

To determine the value of a number we multiply the value of the character times the value of the position it occupies. Thus 234 decimal is $2 \times 10^2 + 3 \times 10^1 + 4 \times 10^0$. Remember, any number raised to the zero power is equal to one.

The hexadecimal system is similar. Each position to the left of the decimal point (or, more correctly, the hexadecimal point) has a value of sixteen (the base) raised to a power equal to the number of positions to the left of the decimal point minus one.

16^4	16^3	16^2	16^1	16^0
65536	4096	256	16	1

To determine the decimal value of a hexadecimal number, multiply the character value times the value of the position it occupies and add all the values. For example, 234 hex is equal to $2 \times 16^2 + 3 \times 16^1 + 4 \times 16^0$ which adds up to 564 decimal. Position 3C00 hex in the TRS-80 memory (position one in video memory) would be $3 \times 16^3 + 12 \times 16^2 + 0 \times 16^1 + 0 \times 16^0 = 15360$ decimal. Pretty laborious!

To go from decimal to hexadecimal is even worse. The decimal number must be divided by the largest power of sixteen that results in a whole number. This value times the power of sixteen is then subtracted from the original and the process repeated. Example 1 shows you how to convert 15360 decimal to hexadecimal.

The Programmable Calculator

Your programmable calculator can perform these multiple operations for you. The only real difficulty is that the hexadecimal system has sixteen characters per position while your decimal calculator has only ten.

You can get around this problem by entering all hexadecimal characters greater than nine as their decimal equivalents. Thus, a hexadecimal A is entered as 10, a B as 11, a C as 12, a D as 13, an E as 14 and an F as 15.

With this procedure in mind, program your calculator to perform the following operations for hexadecimal to decimal conversion.

$$\underline{n} \times 4096 + (2 \times 256) + (\underline{n} \times 16) + (\underline{n}) =$$

N is a hexadecimal character expressed as zero to fifteen. It is important to note that you must enter four hexadecimal characters. If you are converting hex FF to decimal you must enter 0, 0, 15, 15. The answer will be dis-

```
Label1
n
Store0 ÷ 4096 = Int Store1 × 1000000 = Store5
Recall0 – (Recall2 × 4096) = Store6 ÷ 256 = Int
Store2 = 10000 = Mem + 5
Recall6 – (Recall2 × 256) = Store7 ÷ 16 Int
Store3 × 100 = Mem + 5
Recall7 – (Recall3 × 16) = Mem + 5
Recall5
```

Program Listing 1.

played on your calculator. Hexadecimal numbers larger than FFFF cannot be converted by this routine.

The procedure for converting decimal to hexadecimal is a little more involved. By making liberal use of the calculator's storage facilities I managed to fit both the previous hex to decimal and the following decimal to hex conversion routines in the calculator's 128 program steps (Program Listing 1). By attaching a label to this routine I am able to select it directly by using the GOTO function on the keyboard.

N is the decimal number you wish to convert. The number must be in the range of 0 to 65535. The result, from memory five, will be displayed in eight adjacent display positions; two digits per hex character. Thus 65000 decimal would be converted and displayed as 15, 13, 14, 08.

As before, you must make the mental conversion to FDE8. This conversion, however, is well within the capabilities of your bionic computer. If you convert small numbers, say 256 decimal, the result will be displayed as 15, 15 (FF hex) on the display. The high order digits, being all zeros, are suppressed.

There you have it. It has saved me many hours of laborious pencil scratching and table fumbling. And it has put my old programmable calculator back into active use. ■

```
        3          12        0        0
4096√15360   256√3072    16√0     1√0   =   3C00 hex.
   12288        256
    3072         512
                 512
                   0
```

Example 1. Decimal to Hex Conversion of 15,360.

MOVING?

Let us know 8 weeks in advance so that you won't miss a single issue of 80 Microcomputing.

Attach old label where indicated and print new address in space provided. Also include your mailing label whenever you write concerning your subscription. It helps us serve you promptly.

☐ Address change only ☐ Extend subscription ☐ Enter new subscription
☐ 1 year $18.00 ☐ Payment enclosed ☐ Bill me later

If you have no label handy, print OLD address here *print NEW address here*

AFFIX LABEL

Name_____ Name_____
Address_____ Address_____
City_____ State_____ Zip_____ City_____ State_____ Zip_____

80 MICROCOMPUTING P.O. Box 981 ● Farmingdale NY 11737

Make the most of your TRS-80 with the authors TRS-80 owners know and trust.

✓354

More than 115,000 sold!

TRS-80™ BASIC

Bob Albrecht, Don Inman, & Ramon Zamora

"If you're a rank beginner in computing with a TRS-80 I equipped with level II Basic, your novice status won't last long. **TRS-80 Basic** leads you by the hand through the maze of programming the computer to perform both entertaining and useful tasks." **—Interface Age**

"Outstanding . . . **TRS-80 Basic** is the best thing to happen to Level II owners!" **—Computronics Monthly News Magazine**

$8.95 (paper)

DATA FILE PROGRAMMING IN BASIC

LeRoy Finkel & Jerald R. Brown

This easy-to-follow guide lets you master the powerful tool of data file programming—the key to sophisticated home and business applications like processing numerical data and monitoring billings, inventories, and expenses. You'll learn how to write and maintain your own data file programs, modify programs you've purchased, and adapt data files found in magazines and other sources, to perform hundreds of useful operations using TRS-80 BASIC, Microsoft BASIC-80, and Northstar BASIC.

$9.95 (paper)

New! First printing of 100,000!

MORE TRS-80™ BASIC

Don Inman, Ramon Zamora, & Bob Albrecht

An exciting new interactive guide from the authors of the best-selling **TRS-80 Basic.** Learn scores of practical applications—including "supergraphics", file techniques, animation, and games, plus "universal" applications easily adapted to specific problems.

$8.95 (paper)

THE 8080/Z80 ASSEMBLY LANGUAGE Techniques For Improved Programming

Alan R. Miller

Get every response your micro is capable of, with this complete guide to programming the popular 8080 and Z80 microprocessors. Geared to advanced and intermediate programmers, this easy-to-use manual shows you how to use your computer's own language to perform complex, sophisticated operations with unmatched ease and efficiency. Includes more than 100 pages of programs and systems for monitoring and testing your programs.

$9.95 (paper)

USING CP/M®

Judi N. Fernandez & Ruth Ashley

This detailed, self-paced introduction to Control Program/Microcomputers—the most widely used microcomputer operating system—lets you get maximum capability and efficiency from your micro. Use CP/M to create, erase, and copy files, run other programs, translate and test 8080 Assembler language programs, print data from files, display the directory of a disk, and much more.

$8.95 (paper)

Look for these and other Wiley Microcomputer Self-Teaching Guides at your favorite bookstore or computer shop. For more information, and a complete listing of current and forthcoming STGs, write to Pam Byers, Dept. 2-1009.

JOHN WILEY & SONS, Inc.
605 Third Avenue, New York, N.Y. 10158
In Canada: 22 Worcester Road, Rexdale, Ontario, M9W 1L1
Prices subject to change.
2-1009

✓See List of Advertisers on page 306

Generate random sequences according to Poisson, exponential or normal distributions.

Not-So-Random Numbers

Timothy R. Zeigler
USAF
309 N. 49th St.
Grand Forks, ND 58201

The random number generator (RND) available in TRS-80 BASIC is easy to use and serves its purpose very well. It returns random numbers from a uniform distribution. You specify the parameters of this distribution by the argument you use when calling the function.

There is, however, more to random numbers than those returned by RND. Many applications, especially those in the area of simulation, require the user to be able to generate numbers selected at random from a specified distribution with specified parameters. This cannot be done by use of the RND function alone.

The Program Listing contains three subroutines which can be used to generate random numbers from a theoretical distribution of stated parameters. Random numbers can be generated from the Poisson, exponential or normal distributions, depending on which subroutine is called. The functions available in TRS-80 BASIC provide the necessary ingredients to generate these random numbers. A quick review of the three distributions is in order before discussing the subroutines.

Three Common Distributions

The Poisson distribution, Fig. 1a, is a discrete distribution specified by one parameter, Lambda. The mean and the variance of a Poisson distribution are both equal to Lambda. Lambda need not be an integer, but it must be positive. Customer arrivals, in many queuing situations, follow a Poisson distribution with a mean of Lambda.

The Poisson and exponential distributions are closely related. If customer arrivals follow a Poisson distribution, the time between arrivals follows an exponential distribution. The exponential distribution, Fig. 1b, is a continuous distribution specified by the parameter Theta. Theta is the mean of the distribution and must also be positive. Many phenomena follow an exponential distribution. The time between failures of the ICs in your micro is an excellent example.

The normal distribution, Fig. 1c, is by far the most noted of distributions. Its parameters are the mean and the standard deviation. The mean identifies the center of the distribution and the standard deviation the spread. The normal distribution is a continuous distribution. It is also symmetrical.

Generating Other Random Numbers

The subroutines in the Program Listing contain the algorithms necessary to convert the random number that results from RND(0) to a random number from one of the three distributions discussed. Since the parameters of the distribution determine the shape of the resulting distribution, the user must set the parameters before calling the desired subroutine.

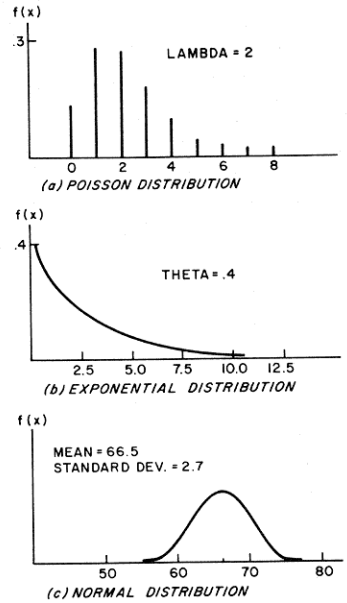


Fig. 1.

Lambda must be set in the variable LA, if a Poisson random number is desired. Theta must be set in the variable TA for an exponential random number. Before calling the normal random number generator, the mean must be set in EX and the standard deviation in SD. In all cases, the random number is returned in the variable RN. Comments in the subroutines also indicate what variables are used internally by each subroutine.

Several goodness-of-fit tests have been conducted on the numbers generated by these subroutines. The tests were accomplished using the Statistical Package for the Social Sciences (SPSS). As written, the subroutines provide numbers that fit the specified distributions and parameters.

Those interested in the "mathemagics" necessary to generate these random numbers will find several textbooks available. My reference was Robert E. Shannon's text entitled *Systems Simulation—The Art and Science*, published in 1975 by Prentice-Hall, Inc. This text also contains FORTRAN listings of similar subroutines.■

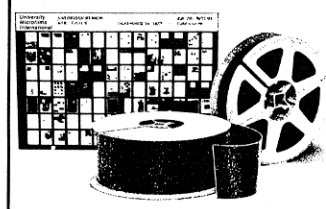
Eds. Note: The line printer used by 80 Microcomputing *prints a [instead of an ↑.*

Program Listing

```
1 CLS:PRINT"LINES 10 - 700 ARE A PROGRAM I HAVE WRITTEN
      TO GENERATE
  RANDOM NUMBERS FROM THE VARIOUS DISTRIBUTIONS.
2 PRINT"THE ARTICLE REFERS TO THE SUBROUTINES THAT BEGI
     N AT
LINE 720.
3 PRINT:INPUT"HIT ENTER TO CONTINUE";A$
10 RANDOM
20 CLS:CLEAR400
30 F$="#####.###":F1$="####"
40 DEFINT I,J,K
50 P$=STRING$(128," ")
60 ON ERROR GOTO 690
70 PRINT "1--> N(EX,ST)
80 PRINT "2--> POSN(LAMBDA)
90 PRINT "3--> EXPON(THETA)
100 PRINT "4--> UNIFORM(0,MAX)
110 INPUT "WHICH DISTRIBUTION DO YOU WANT TO GETNERATE
     1,2,3, OR 4";J
120 INPUT "HOW MANY NUMBERS DO YOU WANT TO GENERATE";II

130 IF II>4000 THEN PRINTII;"IS TO LARGE, TRY SOMETHING
      LESS THAN 4000":GOTO120
140 DIM NUM(II)
150 DIM C(128)   '*********** HISTOGRAM
160 ON J GOTO 170  ,190  ,210  ,320
170 INPUT "ENTER THE MEAN";EX
180 INPUT"ENTER THE STANDARD DEVIATION";SD:GOTO 220
190 INPUT "ENTER  LAMBDA";LA
200 GOTO 220
210 INPUT "ENTER  THETA";TA
220 '
230 FOR I=1 TO II    ' HOW MANY NUMBERS TO GENERATE
240 PRINT"I'M WORKING AS FAST AS I CAN":PRINT@814,I
250 ON J GOTO 260  ,270  ,280
260 GOSUB730  : NUM(I)=RN: GOTO290
270 GOSUB830  : NUM(I)=RN: GOTO290
280 GOSUB960  : NUM(I)=RN: GOTO290
290 IK=RN+.5:IF IK<0 OR IK>128 THEN IK=128
300 C(IK)=C(IK)+1:NEXT
310 GOTO350
320 INPUT"ENTER THE MAX";EX
330 FOR I=1TOII:NUM(I)=RND(EX):C(NUM(I))=C(NUM(I))+1
340 PRINT"I'M WORKING AS FAST AS I CAN":PRINT@814,I:NEX
     T
350 INPUT"PRINT NUMBER  Y/N";N$:IF N$="N" THEN 430
360 IF II<=5 THEN J=II: GOTO 420
370 I=II/5: J=II-(I*5): K=0
380 FOR KK=1TOI: PRINT USING F1$;KK+1000;:PRINT";";
390 PRINT USING F$;NUM(K+1);NUM(K+2);NUM(K+3);NUM(K+4);
     NUM(K+5)
400 K=K+5: NEXT
410 IF (II-(I*5))=0 THEN 430
420 PRINT USING F1$;KK+1000;:PRINT";": FOR K=1 TO J: P
     RINT USING F$;NUM(K);: NEXT
430 PRINT:INPUT "SAVE ON DISK   Y/N";N$
440 IF N$="N" GOTO 530
450 INPUT "ENTER FILENAME";N$
460 OPEN "O",1,N$
470 I=II/5: J=II-(I*5): K=0
480 FOR KK=1TOI: PRINT#1,KK+1000;CHR$(61);:
490 PRINT#1,USING F$;NUM(K+1);NUM(K+2);NUM(K+3);NUM(K+4
     );NUM(K+5)
500 K=K+5: NEXT
510 IF (II-(I*5))=0 THEN 690
520 PRINT#1, KK+1000;CHR$(61);: FOR K=1TOJ: PRINT#1,USI
     NG F$;NUM(K);:NEXT
530 INPUT"IF YOU WANT A HARD COPY OF THE HISTOGRAM
GET THE PRINTER READY AND TYPE Y  ELSE N";N$
540 CLS:PRINT"MEAN = ";EX,"STANDARD DEVIATION = ";SD
550 FOR IK=1TO128
560 IY=47-C(IK)/(INT(II/1000)+1)
570 FOR IR=47 TO IY STEP -1
580 SET (IK-1,IR)
590 NEXT IR,IK
600 IF N$="N" END
610 LPRINT "MEAN = ";EX,"STANDARD DEVIATION = ";SD,"NUM
     BER =";II:LPRINT:LPRINT
620 FOR ID =3 TO 47
630 FOR IX =0 TO 127
640 IF POINT (IX,ID) THEN MID$(P$,IX+1,1)="*"
650 NEXT IX
660 IF INSTR(1,P$,"*")=0THEN GOTO680
670 LPRINT P$:P$=STRING$(128," ")
680 NEXT ID:END
690 CLOSE
700 END
710 '*************************************************
     ****
720 '  tHE ARTICLE REFERS TO THE SUBROUTINES THAT FOLLO
     W
730  'GENERATES A NUMBER FROM THE NORMAL DITRIBUTION  N
     (EX,SD)
```

Program continues



this publication is available in microform

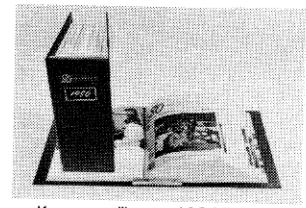
Please send me additional information

University Microfilms International
300 North Zeeb Road
Dept. P.R.
Ann Arbor, MI 48106
U.S.A.

18 Bedford Row
Dept. P.R.
London, WC1R 4EJ
England

BINDERS order yours today

80 microcomputing T.M.



Keep your library of 80 Microcomputing safe from loss or damage in these handsomely appointed binders with rich dark green covers and gold lettering. Each binder holds 12 issues making an EXCELLENT REFERENCE HANDBOOK. Several binders form a quality library you can be proud of.

$7.50 each . . . 3 for $21.75
6 for $42.00

Postage paid in U.S.A. Foreign orders please include $2.50 for postage.

Send check or money order only to:
80 MICROCOMPUTING BINDERS
P.O. Box 5120, Phila., PA 19141

Please no C.O.D. orders, no phone orders.

Allow 6-8 weeks for delivery.

PMC80 16K Level II
Campatible with all TRS80* hardware and software plus it has an S100 bus
$499

Expansion interface (for PMC80) with disk controller, RS232, parallel, 2 empty slots
$299
Expand to 48K for $219

Call us for Model III

EPSON MX 80 PRINTER
$469
Aerocomp disk drives
120 day warranty
Best Buy - 80 track flippy
$429 complete
Flip diskette and use both sides!
Diskettes $2.25

Color
Sound
Synthesizer
High Resolution
Graphics
Fully Expandable
9K RAM 14K ROM
LOW PRICE
APF Imagination Machine
$475

With expansion box, disk controller and 5¼ drive $849
SI 232 Serial interface cartridge. Connect a printer or modem!
$135

A lot of companies offer "unbeatable" prices — TGS is serious about giving you the lowest prices possible on only the best quality products. We will meet or beat anyone's price. Buying from companies that advertise high prices and a meet or beat policy is self-defeating — TGS will go out of business and you'll be back paying those high advertised prices! We can get almost ANY computer or related product for you at the lowest possible cost. All prices cash discounted.

M/C, Visa, COD add 5%. Shipping freight collect, 5%, or $5 per item, your choice.

THE GRAPHIC SOURCE
Route 2, Box 44 ✓73
Canton, Kansas 67428
(316) 628-4935

*Trademark of Tandy/Radio Shack

✓See List of Advertisers on page 306

STATISTICAL ANALYSIS PACKAGE

"Absolutely the best statistical analysis package I've seen for a microcomputer..."
Eugene Allred, President of Consolidated Data Services

StatPac is a 3-part program written and designed for research, survey and questionnaire processing, data entry, statistical analysis, management and market analysis.

Whether you're a researcher, a programmer or reader and user of data — StatPac can fit your needs because you create the data file format to fit your specifications.

Stat Pac is the SPSS of small computers. It eliminates the need for expensive programming or renting time on large mainframe computers.

Available for Model I (requires NEWDOS) or Model III, 2 disk drives, 48K RAM and a lineprinter. StatPac handles all phases of research analysis including: frequency analysis, descriptive statistics, crosstabs & chi-square, t-test, correlation & linear regression, analysis of variance, multiple linear regression and management reports.

CODEBOOK AND DATA ENTRY

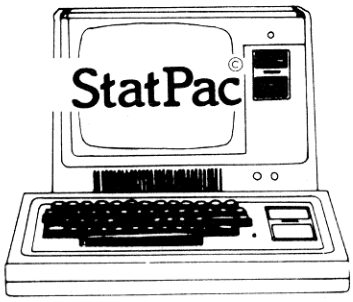
Enter data using key-to-disc system with automatic back-up of data to protect against system crashes. Enter survey, report, test or lab data using fixed or free format. Programs feature screen prompting to guide data entry operator, automatic error detection, user-definable tab stops, repeating keyboard, plus much more.

DATA MANIPULATION

Edit your files with fast machine language editor using "pencil"-like commands, better than "pencil." Verify data files for "out-of-bounds" entries. Recode and transform data using conditional and absolute recodes and unlimited logical operators. Edit files larger than memory size. Accepts up to 2000 cases and up to 255 variables.

STATISTICAL ANALYSIS AND BATCH PROCESSING

Create a "task control file" to specify all analysis for batch processing. Save, edit or reuse task control file on other data sets. "Select if" feature allows analysis on partial data sets. All outputs to parallel or RS232 lineprinter. Error trapping features minimize aborted jobs.



Total package of 3 disks and extensive step-by-step user's manual is $185. Manual may be purchased separately for $30, and may be applied to the purchase price. Entire package includes over 30 integrated programs.

Write or call for free 16 page brochure.

Walonick Associates ✓363
5624 Girard Ave. So.
Minneapolis, MN 55419
(612) 866-9022

Professional software

TRS-80® MODEL II

NOW AVAILABLE!

BASIC CROSS REFERENCE

- FIND WHERE NAMES ARE USED FAST!
- CAN YOU DELETE THAT LINE? FIND OUT!
- DO YOU HAVE DEAD CODING?
- WANT A NICE PROGRAM LISTING WITH DATE & TIME IN HEADING
- SAVE HOURS!
- PARALLEL/SERIAL PRINTERS
- SEVERAL OPTIONS
- 6/8 LPI VARIABLE LINE WIDTH & PAGE DEPTH

$59.99 + $3.00 POSTAGE & HANDLING

$100.00 FOR VECTOR GRAPHICS SYSTEMS. DOCUMENTATION ONLY $10.00 DEDUCTIBLE ON PURCHASE

DISK SORT

- YOU DON'T HAVE TO BE A PROGRAMMER TO USE IT!
- MENU DRIVEN
- RANDOM FILES
- CHAINS TO SYSTEM OR BASIC PROGRAMS
- EASY TO USE
- FAST!
- SPECS SAVED ON DISK
- EASY TO INSERT INTO JOB STREAM FOR NON-STOP RUNNING!

$69.99 + $3.00 POSTAGE & HANDLING

DOCUMENTATION ONLY $10.00 DEDUCTIBLE ON PURCHASE

BASIC COMPILER

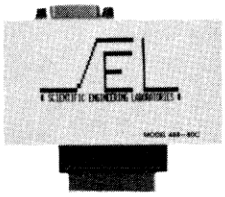
- TRSDOS*/BASIC COMPATIBLE!
- FASTER THAN BASIC BY UP TO 30 TIMES
- EASY TO USE
- AUGMENTED WITH OUR DOCUMENTATION
- WRITTEN BY MICROSOFT

$350.00 ~~$399.00 LIST~~ + $5.00 POSTAGE & HANDLING

*TRS-80® & *TRSDOS* ARE REGISTERED TRADEMARKS OF TANDY CORP.

GOOD-LYDDON DATA SYSTEMS ✓218
5486 RIVERSIDE DR., CHINO, CA. 91710
MASTER CHARGE or VISA accepted.

Model 488-80B For Model 1 Operation



Model 488-80C For Model 3 Operation

IEEE-488 TO TRS-80* INTERFACE

Everything needed to add *powerful* BASIC GPIB-488 controller capability to TRS-80 Model 1 or 3, Level 2 or DOS with a minimum of 16K.

488-80B or 488-80C $245.
+ shipping, insurance & tax

Optional Relocatable Machine Level GPIB Driver for Assembler Level Programming-$35.

WHEN ORDERING SPECIFY DISK OR TAPE

SCIENTIFIC ENGINEERING LABORATORIES
11 Neil Drive • Old Bethpage, NY 11804
Telephone: (516) 694-3205 ✓291

**Trademark of Tandy Corp.*
There is no affiliation between Scientific Engineering Laboratories and Tandy Corp. or Radio Shack.

SICK

OF PROGRAMS THAT TREAT YOU LIKE AN IDIOT, WASTING TIME & MONEY??

RANDOM ACCESS PAYROLL

- NO Complicated Initialization
- EDIT & LIST
- QUARTERLY Reports
- PROGRAM Loads In Less than 30 sec.

PAY ANY EMPLOYEE ANYTIME

- SALARIED OR HOURLY
- COMPLETE Including EIC
- PRINTS on NEBS 9020 CHECKS
- NO SPECIAL PAYROLL CHECKS
- SPECIAL HOURS—SPECIAL PAY
- TWO SAVINGS—INCLUDING RIA
- STATE TAX—WORKMENS COMP.
- CLASSED BY Occupation or Dept.
- PAYSTUB Shows Year-to-date
- No Filenames—All Automatic

SEND YOUR STATE TAX SCHEDULE

- We'll Customize for your State Tax

WRITTEN IN BASIC FOR COMPLETE CONTROL

Documentation & Disk $55.00
Documentation only $10.00-credit to purchase

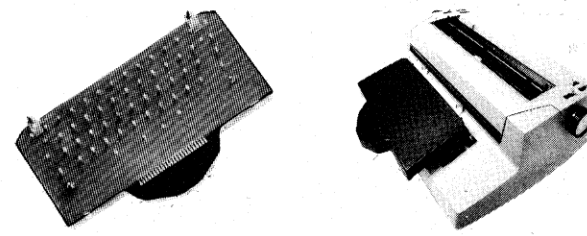
MASS ADD 5% or Exempt number
Requires:
Min. 32K-1 Drive-Printer = 50 EMP
48K-2 Drives-Printer = 100 +
TEL. 7 AM-9:30 PM EASTERN
(617)-359-2364/6370

MEDFIELD ✓421
COMPUTER SOFTWARE
39 GREEN ST., MEDFIELD, MA 02052

```
      EX--MEAN    SD--STANDARD DEVIATION
      ROUTINE USES VARIABLES V8,V9,EX,SD, AND RN
      EX AND SD MUST BE SET BY USER.  RANDOM NUMBER IN
     RN.
740 '
750 '   SEE  SHANNON'S  "SYSTEM SIMULATION"  PAGE 360-3
     62
        FOR AN EXPLANATION OF THE METHOD.
760 '
770 V9=2*RND(0)-1
780 V8=V9[2 + (2*RND(0)-1)[2
790 IF V8>=1 GOTO 770
800 RN = EX + (V9*SQR((-2.0*LOG(V8))/V8))*SD
810 RETURN
820 END
830 '
840 'GENERATES A NUMBER FROM THE POISSON DISTRIBUTION W
     ITH A
      MEAN AND VARIANCE OF LAMBDA.
      LA--LAMBDA
      ROUTINE USES V7,V8,LA, AND RN
      USER MUST SET LA.  RANDOM NUMBER RETURNED IN RN.
850 '
860 '   SEE SHANNON'S  "SYSTEM SIMULATION" PAGE 358-359

         FOR AN EXPANATION OF THE METHOD.
870 RN=0.0
880 V7=EXP(-LA)
890 V8=1.0
900 V8=V8*RND(0)
910 IF (V8-V7)<0 THEN RETURN
920 RN=RN+1.
930 GOTO 900
940 RETURN
950 END
960 '
970 'GENERATES A RANDOM NUMBER FROM AN EXPONENTIAL DIST
     RIBUTION      WITH A MEAN OF THETA.
      TA--THETA
      ROUTINE USES V7,TA, AND RN.
      USERS PROVIDES VALUE FOR THETA IN TA.  RANDOM NUM
     BER IN RN
980 '    SEE SHANNON'S  "SYSTEM SIMULATION" PAGE 360
         FOR AN EXPANATION OF THE METHOD.
990 RN=-TA*LOG(RND(0))
1000 RETURN
```


At last --- the DYNATYPER T.M.
TYPEWRITER INTERFACE!



Turn your electric typewriter into a low cost, high quality hard copy printer. 1 year warranty

DYNATYPER – Rochester Data's patented* Computer/Typewriter Interface is the industry standard for typewriter output.

- 2 minutes to initially install and 5 seconds to remove or replace.
- You do not have to modify your typewriter. All factory warranties and maintenance agreements on your typewriter will be honored.
- Compatible with all power carriage return typewriters having standard U.S. keyboard. The Dynatyper works with Selectrics (model 1) and most non-Selectrics (model 2). Please specify. Typewriter conversion between models takes 2 minutes and the kit (17 plungers) is available for a nominal fee.

RS232 with Basic Available For $699.00

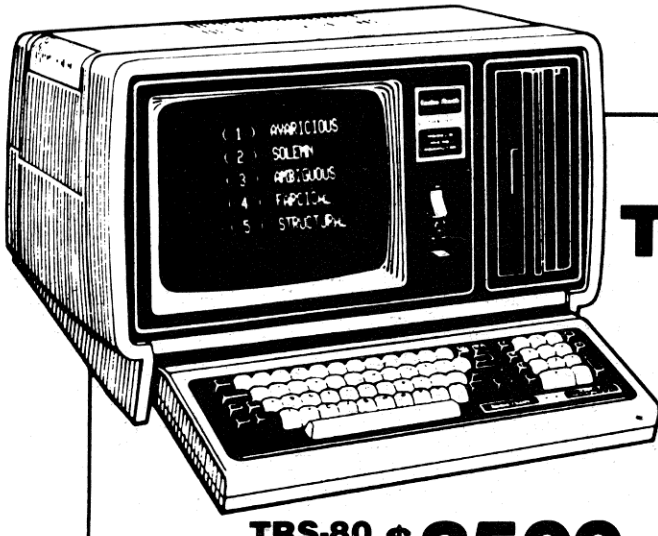
- Delivery: Stock to two weeks. Price $499 for complete system. F.O.B. Rochester, Domestic. VISA and Master Card accepted. Call Ken Yanicky at 716-244-7804

*Pat. Pending

✓468

ROCHESTER DATA incorporated

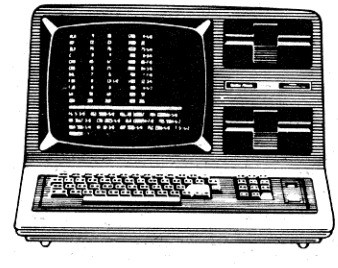
3000 Winton Road South, Rochester, N.Y. 14623



Radio Shack®
DEALER

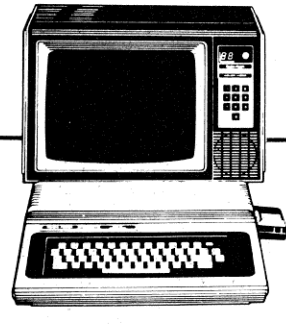
TRS-80™ DISCOUNT

☐ NO OUT-OF-STATE TAX
☐ NO SHIPPING COSTS



TRS-80 MODEL III
32K-2 DISKS
$2100
NEW PERSONAL COMPUTER . . . REAL-TIME CLOCK, SHARPER CRT IMAGES AND FASTER LOADING CASSETTES

TRS-80 MODEL II 64K $3500
PACKS ENOUGH DATA HANDLING POWER FOR MANY SMALL BUSINESSES.



TRS-80 COLOR COMPUTER OR VIDEO $339 each
A LOW COST, COLOR COMPUTER FOR PERSONAL BUSINESS OR ENTERTAINMENT

CERTIFIED CHECKS
CASHIERS CHECKS
OR CREDIT CARDS

MasterCard VISA

PERRY OIL & GAS INC. ✓51
137 NORTH MAIN STREET, PERRY, MICH. 48872
PHONE (517) 625-4161

WARRANTIES HONORED BY ALL RADIO SHACKS • *T.M. TANDY CORP.

✓See List of Advertisers on page 306

These Next 4 Pages are for TRS-80* Owners ONLY!

NEW! Over 100 programs compatible with the Model III.

The next 4 pages contain over 100 Model III compatible programs for your TRS-80. Whatever your interests, we have a software program for you. We list sections on Home/Personal, Business, Games, the Arts, Home Education, Utilities, Special Business, Flight Simulations, Electronics, Comp-U-Novels, and Popular Games. These programs can be purchased through your local Instant Software dealer, or you can call us directly using our toll free number. We ship our orders within 48 hours. Browse through these 4 pages, we're sure you'll enjoy your selections. Remember: WE GUARANTEE IT!

UTILITIES

TRS-80 UTILITY I—Give your program that professional look. RENUM: Renumber any Level II program to make room for modification or to clean up the listing. DUPLIK: With this program you can duplicate any BASIC, assembly/machine language program, verify the data and record the program to tape. You can even record Level I programs on a Level II keyboard. **(T1) Order No. 0081R $9.95.**

TRS-80 UTILITY II—Change the drudgery of editing your programs into a quick, easy job. It includes: ● CFETCH: You'll be able to merge consecutively numbered BASIC programs into one program. It will also search through any Level II program tape and display the file names for all programs. ● CWRITE: Combine subroutines that work in different memory locations into one program. It works with BASIC and/or machine-language programs and will give you a general checksum to verify that your program hasn't dropped any bits. **(T1) Order No. 0076R $9.95.**

THE COMMUNICATOR—This package lets you transmit data over the telephone lines. The full ORIGINATE/ANSWER capability allows your TRS-80 to be controlled from a remote-based terminal, or allows two TRS-80s to "talk" to each other. You can transmit data or programs from home base to a remote terminal. There will be a simultaneous display of information on both video monitors. Requires a modem and RS-232 interface for each terminal. **(T1) Order No. 0126R $9.95.**

TERMINAL-80—Communicate with the rest of the world! These programs give you control of the RS-232 port of your Expansion Interface. You can connect one or more serial terminals to your TRS-80 and it will accept input from the RS-232 interface just as if it were entered from the keyboard. Your TRS-80 can also be transformed into a dumb terminal, for use in a time-sharing situation to talk with "big" computers via a modem. The LPRINT/LLIST commands will transfer a program to a receiving computer. Supports upper/lowercase, Level II & III control characters, and all functions such as CHR$. The baud rate is software controlled for your convenience. Requires an RS-232 interface. **(T1) Order No. 0130R $24.95.**

DISK SCOPE—Need to check out the contents of a disk? Then check out these three programs. ● FILELOC: If you know the name of the program or data file, FILELOC will show you which tracks and sectors contain that file, as well as how much memory the file takes when loaded into RAM. You can then print the information, search for a new file or exit to BASIC. ● CDISK: This utility and test program allows you to view any track and sector on your disks in ASCII, Hex and screen POKEs. It disregards all protection codes. ● PASSWORD: This machine-language program not only gives you a password for individual files, but for whole disks as well. **(T2) Order No. 0139R $19.95.**

DISK EDITOR—This machine-language program gives you total access to ANY byte of information in ANY sector in ANY track of your disk! You can examine, alter, add and delete information with ease. You can even search for a specific string (up to 8 characters long). If you need hardcopy, use the LINEPRINT command to send a copy of the video display to your printer. It can be used with TRSDOS, NEWDOS and Micro-DOS. Both the 35 and 40 track versions are included. **(T2) Order No. 0180RD $39.95.**

BPA (BASIC PROGRAMMING ASSISTANT)—BPA does three things for you: (1) It will list the variables used in a BASIC program. Optionally, it will list the line numbers where each variable appears; the variable-type symbol (string, integer, single or double precision); whether it is dimensioned and where it is changed. (2) It will produce a cross-referenced list of line numbers for GOTO's, GOSUB's and IF...THEN statements. (3) It will list the line numbers where a selected BASIC function word (e.g., INPUT, PRINT) is used. **(T1) Order No. 0203R $14.95.**

TLDIS & DLDIS—These two utilities are ideal for those who wish to decipher and/or modify machine-code programs. TLDIS (Tape-based Labeling DISassembler) and DLDIS (Disk-based Labeling DISassembler) are three-pass, label-assigning disassemblers that assign labels (where appropriate) to the routines in a machine-language program. Their output is almost identical to that of a hand-assembled source code. TLDIS can send the disassembly to cassette tape, DLDIS can send it to disk; both send it to the video monitor. Each version can be reassembled using Tandy's EDTASM or Apparat's disk extension of EDTASM, respectively. You can also send either disassembly to a printer (R/S parallel port). Because of the labels, it is a simple matter to change any object code program by disassembling it and making changes to the resulting source code, without losing track of the jump/load addresses. Labels start at "AA00" and increment up, in even numbered steps (AA02, AA04, etc.). The odd numbers (AA01, AA03, etc.) are left for your (optional) use in the reassembly. **TLDIS (T1) Order No. 0230R $14.95. DLDIS (T2) Order No. 0231RD $19.95. Model III compatible**

THE DISASSEMBLER—This is a single-pass, hex-notation that sends its output either to tape or to a lineprinter (R/S parallel port). The tape output is directly compatible with Tandy's EDTASM, so you can disassemble an object code tape and output it to tape, then use EDTASM to add, delete, change and re-assemble your new version. It displays the *displacement* and *absolute address* of any relative jumps made by the disassembled program. It also displays and ASCII characters used in an LD or CP op-code. It is relocatable and you can jump to memory locations and transfer control between Disassembler and other utility programs. **(T1) Order No. 0232R $9.95.**

COMPRESSION UTILITY PACK—Do you want to add sound routines to a Space Trek program that already uses 16K? Or maybe you need an extra column in that financial report program, but when you run it, you get OM errors?

With a wave of your hand, and a little help from either of the COMPRESSION programs, in this package, your problems are over.

COMPRESS-80 fits in 265 bytes, deletes spaces, and offers the choice of leaving REMark line numbers in the program, or deleting them altogether.

SUPERCOMPRESS uses 767 bytes and can do everything COMPRESS-80 can do PLUS, it packs the program into the smallest possible number of multiple statement lines.

With the Compression Utility Pack and your own programming skill, you can add all those little extras to your BASIC programs. (T1) **Order No. 0246R $19.95.**

CODE—Min. System Required
(T1)=TRS-80 Model I Level II 16K RAM
(T2)=TRS-80 Model I Level II, 16K RAM with Expansion Interface 16 + K RAM and one disk drive
(T3)=TRS-80 Model II, 32K RAM

*TRS-80 is a trademark of Tandy Corporation.

SEE YOUR LOCAL INSTANT SOFTWARE DEALER OR **Just Call Toll-Free 1-800-258-5473**

Instant Software™

PETERBOROUGH, N.H. 03458

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

THE ARTS

COMPU-CAROLS—We are proud to present a selection of Christmas carols, played by your TRS-80. Just place an AM radio next to your keyboard and you'll be amazed at the quality of this computer-generated music. You'll hear AWAY IN A MANGER, NOEL, SILENT NIGHT, O LITTLE TOWN OF BETHLEHEM and eight more of your favorite carols. **(T1) Order No. 0036R $9.95.**

DOODLES AND DISPLAYS II—It includes: ● DOODLE PAD: Draw pictures and save them on cassette tapes. ● SYMMETRICS: An electronic kaleidoscope that's constantly changing. ● DRAWING: Like DOODLE PAD, but for the serious artist. Over 40 user commands. ● RANDOM PATTERN DISPLAY: The computer does the drawing, but those with itchy fingers can make alterations. ● MATHCURVES: Bring those geometry lessons to life. Six different geometrical curves on the screen of your TRS-80. ● RUGPATTERNS: Designs rug patterns with a choice of user or computer control. **(T1) Order No. 0042R $7.95.**

MUSIC MASTER—Includes these four audio treats: ● MICRO-ORGAN: This program changes your computer into a musical instrument, with a range of four octaves with three voices! You can play sharps and flats to imitate the sounds of an organ, harpsichord or piano. ● KALEIDOPY: Now you can have a computerized "player piano." Generate a symmetrical graphics pattern and then see it transformed into music. ● COMPOSER: Experiment with computer-generated music. You can select the length of the piece, its scale, and its tempo. ● KEYMANIA: Test your memory and your musical ear. One to four players try to repeat the melody that the computer creates. **(T1) Order No. 0084R $9.95. Model III compatible**

ELECTRONICS

HAM PACKAGE I—This versatile package lets you solve many of the problems commonly encountered in electronics design, including: ● BASIC ELECTRONICS WITH VOLTAGE DIVIDER: Solve problems involving Ohm's Law, voltage dividers and RC time constants; ● DIPOLE AND YAGI ANTENNAS: Design antennas easily, without tedious calculations. **(T1) Order No. 0007R $7.95. Model III compatible**

ELECTRONICS I—This package will not only calculate component values for you, it will also draw a schematic diagram. Included are: ● TUNED CIRCUITS AND COIL WINDING: Design tuned circuits without restoring to cumbersome tables and calculations; ● 555 TIMER CIRCUITS: Design astable or monostable timing circuits using this popular IC; ● LM-381 PREAMP DESIGN: Design IC preamps with this low-noise IC audio amp. **(T1) Order No. 0008R $7.95. Model III compatible**

QSL MANAGER—Ever looked at your log book and wondered if you sent a QSL card to the operator you worked last week? Maybe you sent a QSL but can't remembered getting one in return. The QSL MANAGER will help you set up a computerized log book that gives you *instant access* to your records. Make complete log entries which include: Date, Time, Call sign, Name, Band, both the sent and received Signal Reports, the Mode, whether a QSL card was sent or received and any remarks you want to add. The QSL MANAGER program has built-in editing features that let you keep your log book up to date. **(T2) Order No. 0151RD $19.95. Model III compatible**

HOME EDUCATION

MONEY MADNESS—You can experience the Raw Power of High Finance with two Big Money empires. ● MILLIONAIRES: Can you manipulate $1000 into a million dollars in fifteen years? It all depends on your strategy as you buy and sell properties, negotiate bank loans, collect rentals and accept sealed bids. ● TIMBER BARON: An in-depth experience of the timber business, from the time you cut the trees until your milled lumber reaches the market. These transactions are affected by those tough, unexpected eventualities that can upset the most careful plans. **(T1) Order No. 0156R $9.95. Model III compatible**

TEACHER'S AIDE—Now you can have the benefits of Computer Aided Instruction (CAI) in your own home. Create a question and answer lesson (up to 8000 characters), save the lesson on disk, then create an entire sequence of lessons. Perfect for parents, teachers and students who need the unlimited patience and undivided attention only a computer can provide. **(T2) Order No. 0214RD $34.95. Model III compatible**

GRADE BOOK—Teachers, now you can use the speed and accuracy of the computer to help calculate student grades. Just type in the grades for tests, quizzes, homework, classwork or special projects to calculate and display individual grade averages. You can also obtain a cumulative grade for a specific marking period—or a whole year! **(T1) Order No. 0050R $9.95. Model III compatible**

TEACHER—This program enables you to create your own tests, quizzes and exercises for the education of your children. You can even provide "graphic" reward for your children and provide hints for problem solving. **(T1) Order No. 0065R $9.95. Model III compatible**

LIFE—Create "living" organisms in which cells are constantly active. They are born, they multiply, they die. This computerized version of LIFE is based on the well known game popularized by Martin Gardner. You can create one-cell organisms, then observe their growth patterns. The library of commands give you unlimited versatility in the control of the cell patterns *you* have arranged. **(T1) Order No. 0078R $9.95. Model III compatible**

ARCHIMEDES' APPRENTICE—This two-part package will teach you the formulas used to find the volume of any solid object including paralellopipeds (cubes and rectangular solids), prisms, pyramids, cylinders, cones and spheres. It will show you on-screen diagrams of these figures, and present you with the formulas you'll need to compute their volumes. **(T1) Order No. 0092R $9.95. Model III compatible**

TYPING TEACHER—This complete seven-part package takes you from initial familiarization with the keys, through typing words and phrases, to complete mastery of the keyboard. Your computer can even become a bottomless page for typing practice. **(T1) Order No. 0099R $9.95. Model III compatible**

VIDEO SPEED READING TRAINER—Most people's reading speed is limited simply because they read individual letters or words. Now you can increase your reading speed and comprehension by reading whole words and phrases. This package will train your mind to quickly recognize numbers, words, letters and phrases. Start at any speed level at which you are comfortable and the computer will automatically advance you as your reading speed and comprehension increases. **(T1) Order No. 0100R $9.95. Model III compatible**

WORDWATCH—four different programs to entertain and educate. ● WORD RACE—race to the finish line of defining words correctly; ● HIDE N SPELL— find the misspelled word, then correct it; ● SPELLING TUTOR—a spelling lesson, but beware, the spelling may become unusual. There you have it, Wordplay × four = WORDWATCH. **(T1) Order No. 0111R $7.95. Model III compatible**

MIND WARP—This game includes: ● MIND TWIST: a Mastermind-type game with a twist. Try to guess the computer's secret digit sequence. ● MIND BENDER: A multi-level game where you must discover the computer's secret code. It's no mystery, the MIND WARP package is for puzzle lovers everywhere. **(TI) Order No. 0118R $9.95. Model III compatible**

INVESTOR'S PARADISE—Here are two programs to test your skill in the stock market. ● STOCK TREK: a stock market simulation in which you and up to five other investors buy and sell stocks. ● SPECULATION: a step beyond a mere simulation, you enter financial data on up to 25 real companies and start playing the market. This package lets you experience the thrills and triumphs of the stock market without risking a dime! **(T1) Order No. 0125R $9.95. Model III compatible**

IQ TEST—IQ TEST will administer and score an intelligence test in just 30 minutes. There are three equivalent tests, each consisting of 3 questions that survey your general knowledge and problem solving abilities. **(T1) Order No. 0157R $9.95.**

SPECIAL BUSINESS

BOWLING LEAGUE SECRETARY—This package is simple to operate and provides a dynamic reference to all the names of individual bowlers, their team numbers, scores, team names, league data and all necessary statistics. The system is highly adaptable, with 17 different scoring options that allow you to custom tailor the program to suit your league's special needs. And, if you even have any problems, simply type HELP and the program will give you an explanation of what information is needed—complete with a sample entry. The system puts at your fingertips all individual weekly scores, team cumulative scores, bowler cumulative scores and individual leaders in the following categories: high single, high series, high average and high points. **(T2) Order No. 0095RD $49.95. Model III compatible**

*TRS-80 is a trademark of Tandy Corporation.

SEE YOUR LOCAL
INSTANT SOFTWARE DEALER OR

Just Call Toll-Free
1-800-258-5473

BEGINNER'S RUSSIAN—In order to understand a foreign culture, you must know its language. The three programs in this package will give you on-screen displays of the characters of the Cyrillic alphabet, detailed instructions of their proper pronunciation and exercises that will have you recognizing and speaking simple Russian words. An excellent package for students, businessmen, scientists or anyone who is interested in learning the Russian language. **(T1) Order No. 0136R $9.95. Model III compatible**

EVERYDAY RUSSIAN—will acquaint you with the words for various foods, places to eat, signs and the names of stores—exactly what a traveller needs to know. Each of the three parts of the package not only teaches you the words but quizzes you on them as well. You can even practice typing in Russian. Discover the Russian language today! **(T1) Order No. 0137R $9.95. Model III compatible**

NO MATTER WHAT YOUR NEEDS ARE, INSTANT SOFTWARE HAS A PROGRAM FOR YOU.

BOWLING LEAGUE STATISTICS SYSTEM—Keeps a computerized list of league data, team data and data for each bowler. Extremely flexible, it has a total of 16 different options to let you modify the program to suit your league's rules. It is easy to use and has a built-in "HELP" feature to aid you. **(T1) Order No. 0056R $24.95.**

HOME/PERSONAL

HOUSEHOLD ACCOUNTANT—Save with these two programs: ● BUDGET & EXPENSE ANALYSIS: It has nine sections for income and expenses and an option for quarterly/yearly reviews. ● LIFE INSURANCE COST COMPARISON: Compare the total costs of various insurance policies. Contrast term with whole life. It will store and display up to six prospective policies. **(T1) Order No. 0069 $7.95. Model III compatible**

PERSONAL BILL PAYING—You can keep a computerized list of ALL your bills (up to 22 accounts), each listed with its name, number, due date and amount owed. Individual accounts can be displayed with a month-by-month breakdown of payments (including check numbers) and current accounts can be seperated from inactive ones. It allows you to save the data to tape for future use. **(T1) Order No. 0103R $7.95 Model III compatible**

WRITE FOR OUR NEW INSTANT SOFTWARE CATALOG

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

Instant Software™

PETERBOROUGH, N.H. 03458

TRS-80* Software From Function to Fantasy

POPULAR GAMES

BEGINNER'S BACKGAMMON/KENO—Why sit alone when you can play these fascinating games: ● BACKGAMMON: Play against the computer in a game that's sure to sharpen your skills; ● KENO: Enjoy this popular Las Vegas gambling game—guess the right numbers and win big! **(T1) Order No. 0004R $7.95. Model III compatible**

CHESSMATE-80—This versatile chess opponent gives you a choice of ten levels of play, from the "blitz" level (the computer has 3 seconds to move) to the infinity level (where the computer will consider every possible move—which could take years). This machine-language program is a conservative player and follows all the rules of international play. CHESSMATE-80 can teach you how to move and allow you to set up the board and play end games or special problems. CHESSMATE-80 battled Sargon II to a draw at two minutes a move and beat Microchess 1.5 in six moves. **(T1) Order No. 0057R $19.95. Model III compatible**

YOUR CRIBBAGE AND CHECKERS PARTNER—CRIBBAGE is a two-person game that you are sure to enjoy. This is NOT a tutorial—it is a game worthy adversary. CHECKERS: An old favorite which follows international rules, including multiple jumps. **(T1) Order No. 0068R $9.95. Model III compatible**

CARDS—A one-player package to let you play, with your computer, these famous games: ● DRAW AND STUD POKER: These programs will keep your game sharp; ● NO-TRUMP BRIDGE: Develop your strategy and (hopefully) increase your skill. **(T1) Order No. 0063R $7.95. Model III compatible**

FLIGHT SIMULATIONS

RAMROM PATROL/TIE FIGHTER/KLINGON CAPTURE—•RAMROM PATROL: Destroy the RamRom ships before they capture you. •TIE FIGHTER: Wipe out the enemy Tie fighters and become a hero of the Rebellion. •KLINGON CAPTURE: You must capture the Klingon ship intact. **(T1) Order No. 0028R $7.95. Model III compatible**

FLIGHT PATH—This three-part package includes: •MOUNTAIN PILOT: Become a daring bush pilot and fly supplies to a remote mining camp. You must cross mountain ranges and struggle with headwinds, tricky navigation and rapidly diminishing fuel. •O'HARE: A control tower simulation for you would-be Air Traffice Controllers. You are responsible for the lives of hundreds of passengers as you guide aircraft through your control sector. •PRECISION APPROACH RADAR: Combines the skills of pilot and Air Traffic Controller, as your commands guide an aircraft in its approach to the field and a safe landing. **(T1) Order No. 0171R $9.95. Model III compatible**

BALL TURRET GUNNER—Imagine yourself at the control console of a strategic laser weapon, deep in the space lanes. Your hindsight detector informs you of a Gnat fighter coming in for an attack so you swivel you laser turret until you can see the target. Watch the Range Indicator and your Targeting Computer's readout closely, because you'll only have a fraction of a second to catch him in your sights. Will you transform the Gnat into a ball of ionized gas or will you see that blinding flash that means The Big Demotion? BALL TURRET GUNNER, with you choice of multiple levels of difficulty, optional sound effects and excellent graphics, is more than a game. It's an event to be savored. **(T1) Order No. 0051R $9.95. Model III compatible**

JET FIGHTER PILOT—In this brilliantly realistic simulation, you become the pilot of a twin turbo-jet fighter. Begin your mission from either the deck of a carrier or from an airfield. During flight, you'll need to constantly monitor your display and make the necessary adjustments to the throttle, flaps, and air spoilers; you must decide when to retract landing gear and release your drop tanks! There is an on-board Navigational Computer, a Glideslope/Localizer and a Weapons Control Computer. Earn your wings with JET FIGHTER PILOT. **(T1) Order No. 0159R $14.95. Model III compatible**

SPACE TREK II—Protect the quadrant from the invading Klingon warships. The Enterprise is equipped with phasers, photon torpedoes, impulse power and warp drive. **(T1) Order No. 0002R $7.95. Model III compatible**

AIR FLIGHT SIMULATION—Take off and land your aircraft without making a crater. This "instruments only" simulation starts you with a full tank of fuel, which gives you a maximum range of about 50 miles. You'll get constant updates of air speed, compass heading and altitude. After you've acquired a few hours of flight time, you can try flying a course against a map or doing aerobatic maneuvers. **T(1) Order No. 0017R. $9.95. Model III compatible**

SPACE TREK IV—•STELLAR WARS: Engage and destroy Tie fighters in your attack on the Death Star. For one player. •POPULATION SIMULATION: A two-player game where you control the economy of two neighboring planets. You must decide: Guns or Butter? **(T1) Order No. 0034R $7.95. Model III compatible**

BASIC AND INTERMEDIATE LUNAR LANDER—Bring your lander in under manual control. The basic version is for beginners; the intermediate version is more difficult, with a choice of landing areas and rugged terrain. **(T1) Order No. 0001R $7.95. Model III compatible**

COSMIC PATROL—We put you in command of a small interstellar patrol craft. You must defend Terran space and prey on the Quelon freighters that carry vital war supplies—but beware of their I-Fighter escorts. They're well armed, extremely fast and they NEVER miss! With its real-time action, impressive sound option and superb graphics, this machine-language program is the best of the genre. **(T1) Order No. 0223R $14.95. Model III compatible**

Airmail Pilot —Return to the early days of aviation. You must fly the mail from Columbus to Chicago. Your Jenny, a cloth-covered biplane, must take you through unpredictable winds, hail and electrical storms. Your mission is to get the mail through in the shortest possible time. There is an on-board clock to time you flight, from takeoff to touchdown . . . assuming you are able to complete it. **(T1) Order No. 0106R $9.95. Model III compatible**

NIGHT FLIGHT—Your mission is to fly over the North Atlantic and make a nighttime photo/recon flight above the enemy fleet. NIGHT FLIGHT lets you take-off, fly and land a propellar-driven aircraft. You can practice approaches and landings with an on-screen display of the landing field information—it will practically teach you to fly. **(T1) Order No. 0117R $9.95. Model III compatible**

COMP-U-NOVELS

WHO-DUN-IT? Criminal elements have committed five dastardly crimes. As the investigating detective, you must solve them.

You can compete against either Detective Nybbles, a computerized sleuth, or up to four other human detectives.

•DEDUCTION: Guess the order of four symbols out of six or seven different ones. To make things even more complicated, you can let the computer repeat symbols and have a range of 2401 possibilities. **(T1) Order No. 0047R $7.95. Model III compatible**

SANTA PARAVIA AND FIUMACCIO Become the ruler of a medieval city-state as you struggle to create a kingdom. Up to six players can compete to see who will become the King or Queen first. **(T1) Order No. 0043R $7.95. Model III compatible**

There are over 450 Instant Software dealers throughout the U.S.A. and the world.

We ship our orders within 48 hours.

CODE—Minimum System Required

(T1) = TRS-80 Model I Level II, 16K RAM
(T2) = TRS-80 Model I Level II, 16K RAM with Expansion Interface 16 + K RAM and one disk drive
(T3) = TRS-80 Model II, 32K RAM

*TRS-80 is a trademark of Tandy Corporation.

*A trademark of Tandy Corporation

SEE YOUR LOCAL INSTANT SOFTWARE DEALER OR

Just Call Toll-Free 1-800-258-5473

WRITE FOR OUR NEW INSTANT SOFTWARE CATALOG

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

Instant Software™

PETERBOROUGH, N.H. 03458

HOME/PERSONAL

THE WORDSLINGER—An economical word processing program that was designed for the individual user or small business featuring: automatic formatting; text editing; and tape storage. Once you've used the WORDSLINGER, you won't want to go back to your typewriter. **(T1) Order No. 0129R $29.95.**

MIMIC—Test your memory and reflexes with five versions of this popular game. You must match the sequence and location of symbols displayed on your monitor within the time limit. Instructions on how to produce accompanying sound effects. **(T1) Order No. 0066R $7.95**

CLIMATE COMP—This two-program package includes: WEATHER FORECASTER, which gives you a short range weather forecast based on the information that you enter and WEATHER PLOT, which will display climatological data for any major city in the United States. **(T1) Order No. 0102R-1 $19.95. Model III compatible**

BODY BUDDY—Includes these three programs: ● ADULT CALORIC REQUIREMENTS: Will determine your Basal Metabolic Rate and suggest strategies to achieve your ideal weight! ● FLEXI-DIET: Creates an "infinite" number of diet menus, on a day-to-day basis. Choose your caloric intake, from 600 to 2400 calories per day. The ● ANATOMY QUIZ program teaches a mini-lesson on the various organs of the human body, giving location, size and function(s). **(T1) Order No. 0109R $9.95. Model III compatible**

ENERGY CONSUMPTION—This program will record and analyze your utility bills for up to five years, when you supply the following information. Gas/Water/Electricity used and their respective costs. It will calculate six monthly usage averages and unit costs. Data can be compared for any month or multi-month periods. **(T1) Order No. 0132R $9.95. Model III compatible**

BUSINESS

SALES ANALYSIS—If your business is sales, you're faced with some unique problems. This package is divided into several modules to help solve those problems: The SALES ANALYSIS module is designed to provide guidelines for determining sales performance, to analyze this performance and show you where it can be improved. The DATA STORAGE module allows you to store data in an automated processing ledger. The MANAGEMENT ANALYSIS module can take all the sales records for your group and show you who your best salespersons are, who needs more training and give you a sales forecast. Finally, the MARKET ANALYSIS module can show you where determined sales efforts can produce the most success. **(T1) Order No. 0131R $24.95. Model III compatible**

ORACLE-80—will provide you with business analysis and forecasting capabilities previously available only on large computer and time-sharing systems. A flexible, professional time series analysis and forecasting package for use in product planning, business planning, sales forecasting and more. Financial managers and economists can analyze economic climates and investigate business cycles. ORACLE-80 is designed to be used and understood by the typical businessperson. All input and output is written in plain English and the package documentation carefully explains *all* the functions of the program. ORACLE-80 puts the future in your hands. **(T2) Order No. 0140R $75.00. Model III compatible**

BUSINESS PACKAGE IV—This business package contains two programs: ● BUSINESS CYCLE ANALYSIS: This program can plot the expansion and contraction cycles of any aspect of your business. ● FINANCIAL ANALYSIS: Now you can get the figures for any type of annuity, sinking fund, or mortgage and compute the yield and value for bonds. The package includes a blank data tape. **(T1) Order No. 0019R $9.95. Model III compatible**

FINANCIAL ASSISTANT—Compute the figures for a wide variety of business needs, including: ● DEPRECIATION: Figure depreciation on equipment five different ways. ● LOAN AMORTIZATION: Enter a few essential factors and get a complete breakdown of all costs and schedules of payment for any loan. ● FINANCIER: Performs thirteen common financial calculations. ● 1% FORECASTING: Use it to forecast sales, expenses, or any other historical data series. **(T2) Order No. 0072R $7.95. Model III compatible**

CHECK MANAGEMENT SYSTEM—Use this program for writing checks and maintaining records. You can make entries, edit/correct entries and print out the checks. It will also search and display records by number, code, date, description or amount. A Code and Search routine allows you to print a report of all checks written for specific expenses. You can print your letterhead and account number at the top of each report. System requirements: **(T2)** with a compatible tractor-feed printer. **0147RD $39.95. Model III compatible**

ACCOUNTS RECEIVABLE/ACCOUNTS PAYABLE—These Model I programs will handle the drudgery involved in AR/AP entries. They will also provide invoices, statements, reports and more. Each program is capable of handling up to 1500 entries per month, posted to as many as 760 accounts. The AR/AP package is ideal for any small business and can easily be used by anyone familiar with AR/AP operations. System requirements (in addition to **T2**: Three disk drives and a Line Printer (tractor-feed). **Order No. 0075RD $199.95. Model III compatible**

MAIL/LIST—With a five-inch drive, you can store up to 600 names per disk without DOS, or 300 names with DOS. The program maintains separate alphabetical and ZIP code files under constant sort. When you add a name or ZIP code to your list, it will be inserted into its correct position in the file. The program will record your data in nine fields: address, city, state, ZIP code, phone number, phone extension and name (2) plus a five character code field. The best feature of this program is the sort process that lets you determine alphabetical or ZIP code order for label printing. **(T2) Order No. 5000RD $99.00 Model III compatible**

ONE-D MAILING LIST—A comprehensive mailing list program that will run on only ONE disk drive! Up to 17 fields of selection for name/address retrieval. Its features include: Auto-sort (alphabetic or ZIP code). Easy error correction and recovery. Prints selective listings. Supports up to 4 drives. Prints mailing labels and listing of all names on file. **(T2) Order No. 0123RD $24.95. Model III compatible**

EXECUTIVE EXPENSE REPORT GENERATOR—Provides you with emergency relief in the form of a clear, plausible expense layout. Input your grand total and cash advance (if any), and you'll receive an itemized expense report, from breakfast to snacks. **(T1) Order No. 0135R $9.95. Model III compatible**

GAMES

WINNER'S DELIGHT—Do you enjoy a challenge? Then try WINNER'S DELIGHT including: ● AMAZING: You must escape from a maze, one that you view from the inside, working against the clock; ● JUNIOR CHECKERS: Not your usual game of checkers . . . the challenge is to beat the computer in the fewest number of moves; ● JUMBO JIGSAW: Fit the pieces together in the fewest number of tries; ● THIRTEEN WAYS: Try to fill up your columns with the numbers you roll on the dice—the computer will try to fill its columns first! **(T1) Order No. 0124R $9.95. Model III compatible**

FUN PACKAGE I—Why call it "Fun Package"? Judge for yourself! This entertaining package includes: •ROCKET PILOT: Flying it is easy—it's the landing that's tough! •PAPER, ROCK, SCISSORS: It's the time-honored game just as you remember it, played against your TRS-80. •HEX I: Just when you master this puzzle game, the computer will increase the difficulty. **•MISSILE ATTACK: Use your missiles to protect your city from jet attack. Requires a TRS-80 Level I 16K. Order No. 0037R $7.95. Model III compatible**

DEMO III—The biggest package ISI has ever released, including: ● RACE 1: Careen around the race course as you try to beat the clock; ● TARGET UFO: Destroy all the invading UFOs; ● LIFE: Experiment with this simulation of the life cycle of a colony of bacteria; ● PHONE NUMBER CONVERTER: Change those hard to remember 7-digit phone numbers into easily remembered words; ● BIORHYTHM: Plot biorhythm curves for anyone, anytime; ● GRAPHICS PROGRAM: This program will show you what your TRS-80's graphics display can do; ● RACE 2: Five different tracks for the more experienced driver; ● HORSE RACE: Up to nine players can bet on and enjoy our most entertaining horse race program; ● DRAWING BOARD: Draw pictures or messages and store them in memory or on cassette tape with this easy-to-use program; ● 24-HOUR CLOCK: Transform your computer into an accurate digital clock. **(TI) Order No. 0055R $7.95**

OIL TYCOON—Avoid oil spills, blowouts and dry wells as you battle to become the world's richest oil tycoon. Two players become the owners of competing oil companies as they search for oil and control their companies. **(T1) Order No. 0023R $7.95.**

BOWLING—Let your TRS-80 set up the pins and keep score. One player can pick up spares and get strikes. **(T1) Order No. 0033R $7.95. Model III compatible**

DEMO II—contains: ● TIC-TAC-TOE: An old time favorite with three levels of difficulty; ● TIME TRIALS: Try to beat the clock as you race your car through curves, chutes, and chicanes; ● MAZE: One or two players can search through the maze for the secret square; ● HANGMAN: One or two players can try to guess the secret word; ● WHEEL OF FORTUNE: Choose your number, place your bet and see if you can break the bank (for one to eight players); ● HURRICANE: You can track and monitor hurricanes in *any* part of the world; ● BUGSY: Can you build your Z-80 bug before the computer does? ● HORSE RACE: Pick a sure winner and place your bet (for 1 to 100 players). **(T1) Order No. 0049R $7.95. Model III compatible**

BATTLEGROUND—It is late 1944 and the Allied forces are sweeping toward Berlin. As General in command, you study the map. At your command are tanks, planes, artillery, infantry, engineers, and vehicles. The battle map of your sector will fill with markers to show the development of your forces. You and your opponent will assume the roles of warring Generals, as the battle unfolds. The stark reality of World War II comes alive in BATTLEGROUND. **(T1) Order No. 0141R $9.95. Model III compatible**

SKIRMISH-80—Check out these great games: ● MISSION IMPOSSIBLE: Your objective in this real-time simulation is to drive your tank into a prison courtyard, rescue a jailed prisoner and escape; ● TRAP: A two-player game, in which you must maneuver your opponent into a position where he is hopelessly trapped; ● WIPEOUT: A two-player game in which your mobile gun gets points by destroying as many obstacles as possible, but be careful—some of those obstacles are explosive mines; ● BLOCK-'EM: A two-person competition in which your moving "snake" tries to force your opponent to hit either (1) your trail, (2) his own trail, (3) the boundaries of the field, or (4) any randomly place barriers. The strategy is, of course, to leave you opponent no safe move. **(T1) Order No. 0070R $9.95. Model III compatible**

POPULAR GAMES

OTHELLO—In the game of Othello, there is no such thing as lucky move. The game is a constant test of concentration and tactics.

Othello pits your strategic powers against a merciless, computerized opponent. You play on a board of 64 squares. When you capture your opponent's game disks (by bracketing them with your own), they immediately change sides, to become members of your set.

Here's a maddening, frustrating, but always engrossing, game for your TRS-80. (T1) **Order No. 0046R $9.95. Model III compatible**

SEE YOUR LOCAL
INSTANT SOFTWARE DEALER OR

Just Call Toll-Free
1-800-258-5473

*TRS-80 is a trademark of Tandy Corporation.

NO MATTER WHAT YOUR NEEDS ARE, INSTANT SOFTWARE HAS A PROGRAM FOR YOU

✓2

Instant Software™

PETERBOROUGH, N.H. 03458

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

✓See List of Advertisers on page 306

Take the Hertz out of continental computing with this battery charger based power supply.

An Alternate Source

John G. Conner KG6JIC
CTF 67 Box 2
FPO New York, NY 09521

I have been operating my TRS-80 on 110 V ac 50 Hertz for the past two months, but have had some problems.

I am in the U.S. Navy and am required to move periodically to new locations around the world. I have been an amateur radio operator for several years and recently acquired the computer bug.

About three weeks before my departure from Guam, I acquired a 16K TRS-80 Level II. My next duty station was to be Naples, Italy.

Blown Fuse

After my arrival in Naples, two of the three boxes in which my 80 and a Quick Printer II were packed, arrived. I plugged the keyboard into 110 V ac 50 cps power available in my office. The VDT was in the last box that had not yet arrived, but a few quick LPRINTs on the keyboard revealed that it was OK.

Four weeks later the last box arrived. I unpacked it hastily and plugged it in; the screen lit up but no MEM SIZE?. The red light on the keyboard was not glowing. The power supply was plugged in, so I concluded that no power was getting to the keyboard. There was a fuse inside the power supply, but Radio Shack's technical manual was no help as it just showed a square marked "power supply."

I checked the ac plug with an ohmmeter. It read open. I pried open the power supply and found a wired 1/2-Amp fuse on a printed circuit board. The fuse was indeed open, so I replaced it and put the case back together with plastic electricians' tape. The TRS-80 worked for about 10 minutes, then the fuse blew again.

A few checks with an ohmmeter indicated that the keyboard was not overloading the power supply, so I decided that the 50 cps power was the culprit. I increased the size of the fuse to 3/4 Amp and put the power supply back into service. The 3/4-Amp fuse lasted about a half hour.

In desperation I soldered a 1-Amp fuse in place and turned the computer on again. The TRS-80 operated for the rest of the day.

Returning to work the next day, the fuse blew again. Removing the electricians' tape, I saw that the transformer had gotten very warm during the night and part of the plastic case was deformed from overheating. Additional checks with an ohmmeter revealed terminal damage; the windings were shorted. Back to the drawing board.

It appeared that the transformer was operating to its limits on 60 Hertz, and it could not tolerate the additional current when operating on 50.

I checked a hardware store and found a 10 Amp 6/12 V battery charger. 10 A seemed like a little overkill. The specs on the bottom of the Radio Shack power supply listed the output at 17 V ac at 1 A and 19 V dc at 350ma. I decided to give the 10 A brute a try. A shipmate supplied me with two chassis mounting fuse holders, a toggle switch and a 10,000 uF 50 volt Cap. A trip to the audio department at the PX turned up a standard 5-pin DIN plug. I drew out the schematic of the battery charger (Fig. 1) and opened it to make the small changes to turn it into a computer power supply.

The outputs were fused to protect the supply and the keyboard. Initial voltage readings (no load) showed the ac output to be 26 V ac and the dc output to be 16 V dc. The 16 V dc looked close enough, but I was worried about the 26 V ac.

My shipmate let me paw through his junk box, and I came up with two 10-Watt, 18-Ohm resistors. I placed these in parallel with each other then in series with the ac output. Ohms law said that if the ac circuit did draw one Amp, then this combination should drop nine volts. I turned the computer on to measure the voltage under load. The dc remained at 16 V dc. The ac dropped less than one-half a volt. Apparently the ac load is considerably less than 1 A.

After I carefully studied the information available on the schematic in the technical manual, I was convinced that it should be

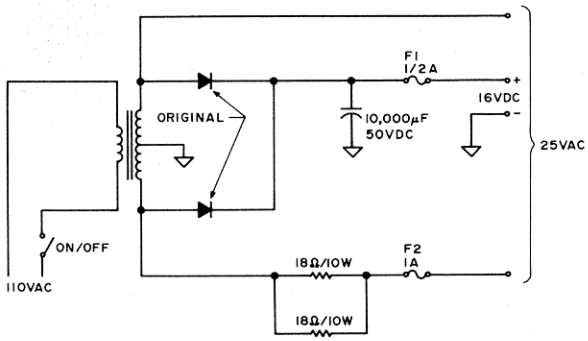


Fig. 1. 10 Amp Battery Charger

OK and I continued to operate the computer.

The TRS-80 has been in operation six to seven hours a day for the last month with this power supply with no apparent problems.

Not once have the severe dips in power during the evening caused me to drop a single bit of information. The transformer in the converted battery charger runs cool and I am running well within its ratings.

That's it. If you're coming to Europe and planning to bring your TRS-80, the voltages throughout Europe are usually 220 V ac at 50 Hertz. The 220 V ac is no problem, as stepdown transformers are readily available from 100 Watts to 5 kW. They are nicely built and accommodate a range of common voltages. I have several in the house and am currently running the TRS-80, cassette, VDT and Quick Printer II on a small 150-Watt transformer. I've discovered no problems. ■

AT LAST!

Mass production prices for high quality software. Buy direct and save 50%. Also available for CPM and HDOS.

DATA BASE MANAGER Mod I & III $69, $149 (48K). Mod-II $199
Maintain a data base and produce reports, all without user programming. Define file parameters and report formats on-line. Key random access, fast multi-key sort, field arithmetics, audit log, label. No time-consuming overlays. 500 happy users in one year. Mod-II and 48K versions have over 50 enhancements, including 40 fields maximum. "IDM-M2 is great!" - 80-US.

A/R Mod-I $69 Mod-II $149 Mod-III $69
Handles invoices, statements, aging, sales analysis, credit checking, forms input, and order entry. Unlike other accounts receivable programs, ours can be used by doctors, store managers, etc.

WORD PROCESSOR $49
Centers, justifies, indents, and numbers pages. Mod-I version features upper/lower case without hardware modification! File merge option available.

MAILING LIST Mod I & III $59, $79 (48K). Mod-II $99
The best! Compare and be selective. Includes forms input, 5-digit selection code, zip code extension, sort on any field, and multiple labels. Who else offers a report writer and merges with word processor?

INVENTORY Mod I & III $89, $109 (48K) Mod-II $149
Fast key random access. Reports include order info, performance summary, EOQ and user-specified reports. Many people have converted to our system! "Next to impossible to damage the file."

GL, A/R, A/P, PAYROLL Mod-II $129 each
Integrated accounting package. 100+ page manual. As opposed to Osborne's slow binary search and 64 column screen, we use fast ISAM and 80 columns. Dual disk and TRSDOS required.

L216 $59
A cassette package of 10 business programs for Level II 16 K systems. Includes word processor and data base manager. Poker game $19.

Most programs are on-line, interactive, random-access, bug-free, documented, and delivered on disks. Mod-I programs require 32K TRSDOS. We're #1 in business software—don't let our low price fool you! Ask for our free 20-page catalog if you're still not convinced. Compiled versions are available.

MICRO ARCHITECT, INC. ✓54
96 Dothan St., Arlington, MA 02174

Dragonquest!

In a desperate race against the sun you search for SMAEGOR Monarch of Dragonfolk, who has kidnapped the Princess of the Realm and holds her in a distant and unknown place. In a quest for Honor and glory, you must search the land, seeking out the tools needed for the ultimate confrontation. On The River Delta, in the abandoned Temple of Baathteski, Goddess of the Blade, everywhere, clues abound. But WHERE is the Princess?

Now, as never before, the genius of CHARLES FORSYTHE shines in this new machine language ADENTURE. DRAGONQUEST! Can YOU save M'lady from the iron clutches of SMAEGOR?

TAPE $15.95 **Dealer Inquiries Invited** **DISK $21.95**

The Programmer's Guild ✓364
Box 66, Peterborough, N.H. 03458
(603) 924-6065 After 6 PM EST

DOUBLE FEATURE

ETI²

IBM Electronic Typewriter Interface for

ANY COMPUTER

2000-Byte Buffer yields up to 700 cps throughput. All typewriter special functions can be accessed from any program.

Applications include word processing, legal, financial and medical forms processing and typesetting.

$495

Call or Write / Available Now

QuicKeys©

An innovation indefinable (soft) key i.d.

These clear, pressure sensitive labels mount on the face of your keys and are color coded for word processing, communications, Level II and Disk Basic programs. Over 425 commands and symbols.

Throw away those scraps of paper! **QuicKeys** keep the commands at your fingertips.

Manufactured by

PAIRR PRODUCTS

$9.95

Add $1. S & H / 6% sales tax in California
VISA / MC Accepted

(213) 475-9949 • P.O. Box 67B57 Los Angeles, CA 90067

MEDIAMIX

Dealer Inquiries invited

MODELS I AND III

ALL PROGRAMS USE TESTED

MICRO - TYPIT A text editing program that uses the keyboard "as is" like a typewriter. All edit and prompt functions are "built in" so instruction or learning is minimum. Text can be generated three pages at a time and printed either numbered, or unnumbered single or double spaced. Also, right justification is optional. Does not require substitution of @ for commas or any other character revision. Slowest function is transferring text to and from tape. Neat error free text with large print titles. Excellent for specifications, agreements, instructions, form letters or announcements. Complete with sound for TRS-80 Model I level II and Microteck printer easily adaptable to other printers. PRICE. . . $25.00

CLIENT FILES Allows keeping several contracts for up to 20 clients. Enter contracts including either payment amounts or percentages. As bills are sent out and payments received, the program is a record by contract of amounts outstanding and not billed including a summary of receivables and work in progress. Works well with one to 3 projects for a dozen or so clients. PRICE. . . $25.00

Engineering Programs

LIGHTING CALCULATIONS Calculates the required number of fixtures for a room given the dimensions and reflectances by the zone cavity method. Three standard fixtures are "built in" so that 8 room calculations are made to compare results such as watts, footcandles and number of fixtures.
PRICE. . . $30.00

ENERGY ANALYSIS The program evaluates a Building per ASHRAE 90-75 by calculating the allowable and actual U values and OTTV for large commercial "B" type Buildings. PRICE. . . $20.00

All tapes furnished with full documentation and instructions. Documentation, Instructions and Source list only. $15.00

All programs require Level II and 16K. Printer is required for MICRO-TYPIT and optional on all others. Don't forget to include the Model number (I or III) with your order.

Send Check or Money Order (no COD's please) to:

✓52

Coolidge & Associates

1317 S. CONGRESS AUSTIN, TEXAS 78704 (512) 443-5329

A copy utility for single disk systems.

One Wheel Drive

Dan Keen and Larry Pezzuto
RD 1 Box 432
State Highway 83
Cape May Court House,
NJ 08210

Many times you need a program on several disks. Perhaps you want a safety backup, in case gremlins get into the only existing copy of your favorite program. If you have a program like TSHORT, you may want to transfer it to a disk you use often, so you don't have to load it separately. Or, again, maybe you want to duplicate a data file so you can work on the program that created the file, or back up an important business file.

If you have two disk drives, backup copies are rapidly made with the COPY command.

If you only have one disk drive, however, you may have to slowly copy a text file by loading it into memory and then saving it. If the file is sequential, random data, or machine language, you may have to use the BACKUP command and copy the contents of the entire disk, then delete everything except the program you want. This also means copying onto a blank disk.

Here's a copy utility that comes to the rescue of the one-drive owner.

This program allows you to copy any file up to 16K (you must have 32K in your computer to use this utility). It also allows you to change the file name of the copied version. Keep the extension on machine language programs, however, or they won't function.

First load the program you want to copy into memory. When you have the destination disk in the drive, it dumps the memory contents back onto disk.

After using this program, type CLEAR 10 in the command mode, or you won't have enough memory space to run anything else, as this program clears 20000.■

```
4 CLS:CLEAR20000:DIMS$(64):DIMS2$(64):PRINT" COPY  UTIL
    ITY ":PRINT
5 INPUT"ENTER FILENAME OF PROGRAM TO BE COPIED: ";A$
6 INPUT"ENTER THE NAME OF THE COPIED FILE: ";B$
8 PRINT:INPUT"HIT <ENTER> WHEN YOU HAVE SOURCE DISK REA
    DY ";C$
10 OPEN"R",1,A$:FIELD1,255ASMY$,1ASLB$
20 FORX=1TOLOF(1):GET1,X:S$(X)=MY$:S2$(X)=LB$:NEXT
30 EF=LOF(1):CLOSE
35 PRINT"FILE ";A$;" HAS BEEN STORED IN RAM."
40 PRINT:PRINT"READY DESTINATION DISK FOR RECIEVING COP
    Y":PRINT
50 INPUT"HIT ENTER WHEN READY";L$
60 OPEN"R",2,B$:FIELD2,255ASNW$,1ASLB$
70 FORX=1TOEF:LSETNW$=S$(X):LSETLB$=S2$(X):PUT2,X:NEXT
80 PRINT"COPY OPERATION IS COMPLETE.":CLOSE:END
```

Program Listing 1

Check our book pages for the latest books about microcomputers.

80 microcomputing mention when you query an advertiser

ADVENTURES FOR
8K PET®
16K TRS-80®
16K TRS-80® COLOR

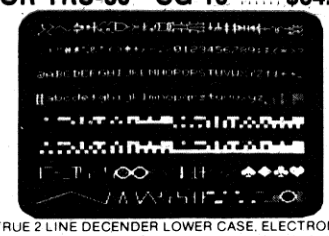
ESCAPE FROM MARS—Explore an ancient Martian city while you prepare for your escape.
NUCLEAR SUBMARINE—Fast moving excitement at the bottom of the sea.
PYRAMID—Our most advanced and most challenging adventure. Takes place in our own special ancient pyramid.
VAMPIRE CASTLE—A day in old Drac's castle. But it's getting dark outside.
DEATH SHIP—It's a cruise ship—but it ain't the Love Boat and survival is far from certain.
TREK ADVENTURE—Takes place on a familiar starship. Almost as good as being there.

$14.95 each

Aardvark Technical Services ✓129
1690 Bolton
Walled Lake, MI 48088
(313) 669-3110 or (313) 624-6316

PET & TRS-80 are trademarks of Commodore

LOWER CASE & GRAPHIC SYMBOLS GENERATOR KIT FOR TRS-80™ CG 16 ..... $64.50



TRUE 2 LINE DECENDER LOWER CASE, ELECTRONIC SYMBOLS, THIN LINE GRAPHICS, GAME SYMBOLS, TEXTURED BACKGROUNDS AND MANY MORE. DEMO CASSETTE IS INCLUDED. FULLY ASSEMBLED WITH DETAIL INSTRUCTION FOR EASY INSTALLATION. REQUIRES ELECT. PENCIL TYPE L.C. MOD OR ORDER MEMORY AND SWITCH KIT, SMK, FOR $18.50

SYNCHRONOUS DATA SEPARATOR FOR DISK USERS. SDS $24.50

THE SYNCHRONOUS DATA SEPARATOR WILL ELIMINATE 100% OF THE SOFT READ ERRORS AND SPEED UP DISK ACCESS TIME BY ELIMINATING RETRIES BY THE DISK CONTROLLER.

THE SDS PLUGS INTO THE DISK CONTROLLER'S SOCKET AND HAS ONLY TWO WIRES TO CONNECT. NO TRACES HAVE TO BE CUT. IT IS THE MOST RELIABLE AND ACCURATE DATA SEPARATOR AVAILABLE.

ADD $2.50 FOR S. & H., CALIF. RES. ADD 6% SALE TAX. SEND CHECK OR MONEY ORDER TO:

G.P. ASSOCIATES ✓203
P.O. BOX 22822, SACRAMENTO, CA 95822 (916) 392-0257

TRS-80 IS A TRADE MARK OF TANDY CORP.

Model III Owners
Copy Scripsit and/or Visicalc™

★ Unlimited disk back-ups of YOUR original
★ No programming or technical knowledge required
★ Works if you have already backed up twice
★ Usable only by original purchaser and intended for his private usage

All orders shipped within 10 days
$15.00
No credit cards, please.

SALES DATA, INC. ✓143
BOX 257 BUHLER, KANSAS 67522

```
*!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←%$#!()*
* LLIST                                                      LPRINT.*
* * * * *                                                   * * * * *
* LPRINT                                                      LLIST.*
* > > > >      E N D   O F   S O F T W A R E   H A S S L E S ! !  < < < < *
*              * * * * * * * * * * * * * * * * * * * * * *              *
* MAGIC BOX (TM) PLUG IT AND GO! NO SOFTWARE NEEDED TO LPRINT / LLIST.*
* **************                                      ************** *
*  PLUG IN THE PARALLEL PRINTER PORT, COMPATIBLE WITH MOST POPULAR    *
*    SERIAL PRINTERS : TELETYPES, H14, DIABLO, QUME, NEC, ECT. . . .  *
*      USES ALL LEVEL2 ROM PRINTER ROUTINES FOR FULL FLEXIBILITY.     *
* *      SELECTABLE SPEED 55 TO 9600 BAUDS.(SPECIFY WHICH SPEED)    * *
* * *      AUTO LINE FEED AFTER C.R. AUTO CARRIAGE RETURN.          * * *
* * *        STOP BITS, PRINTER HANDSHAKE, 20MA LOOP OR RS232.      * * *
* $ $ $  INTRODUCTORY OFFER  109.00 DOLLARS FOR A LIMITED TIME  $ $ $ *
* * *                NINETY DAYS LIMITED WARRANTY.                  * * *
* *                                                                 * *
*                                                                    *
*      1-813-973-0517- 602 GLENWOOD DR. E. ZEPHYRHILLS, FLA 33599    *
*        WATCH FOR SERIAL PRINTER TO CPU INTERFACE COMING SOON.      *
*   NO R.S. INTERFACE OR SOFTWARE WILL BE REQUIRED TO LPRINT / LLIST *
*!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←%$#!()*
```

SERIAL PRINTER USERS

MR X CONSULTING, INC. ✓466

SOFTWARE YOU CAN BET ON!

STUD5

A five card stud program so realistic you'll swear you're facing six professionals. You decide who's bluffing and who has the cards. Your opponents learn your style and that of the others and modify their betting strategies as the game proceeds. You can define the players' characteristics to match those of your Friday night poker club or let your computer define them randomly.

Only $13.00

TOUT3

A vastly improved version of the original TOUT horse race handicapper. Now, thousands of races are simulated in seconds to give you each horse's probability of winning and identify overlays. Horses are screened using factors derived from an operations research study. This handicapper outperforms programs and calculators selling for much more.

Only $19.00

DRAW5

Jacks or better to open with a joker that can be used as an ace or in straights or flushes (Gardenia CA rules). You play against six computer-controlled opponents. This program has true artificial intelligence capabilities. DRAW5 was developed originally by Real World Simulations. After three years of refining, it's now available for the TRS-80. It will provide hours of fun, challenge and education.

Only $13.00

TRADE IN your old advertised handicapping and poker-playing programs and receive a $6.00 credit. Include original cassette/disk and documentation with your order.

All programs on cassette for Level II 16K (Models I and III). Loading guaranteed. Add $3.50 to get one or more programs on a formatted diskette. Pa. residents add 6% sales tax.

WILSON ✓279
Software Division • 539 Springhouse Lane • Camp Hill, PA 17011

TRS-80 is a Tandy Corporation trademark.

QUALITY PRODUCTS FROM.....

THE ALTERNATE SOURCE

SCREENEDIT: Easier to use than the normal EDIT command; more powerful too! To edit a Basic line, LIST it and type EDIT without an argument. You have now activated SCREEN EDIT. Simply typing a letter will change what was there (overwrite), shift left arrow deletes, shift right arrow inserts spaces. Shift down arrow is useful for combining lines. Changing the line number will duplicate that line. Will edit any line 255 characters or less. Enter ends the editing process and Break escapes from editing and cancels all changes. Also allows you to re-execute command lines without retyping them! Don't let the price fool you, this will be a much used utility!!

JUST $9.95

Model I or III — Level II or Disk Basic

THE ALTERNATE SOURCE
1806 Ada Street
Lansing, MI 48910
517-487-3358
✓138 **517-485-0344**

Include $2.00 for crush-proof box and postage, $1.50 for COD, 4% for charge.

✓See List of Advertisers on page 306

Reduce disk read/write errors by calibrating drive speed.

Speedset

Sherman B. Winings
9620 Leeta Cornus Lane
Nokesville, VA 22123

Read/write errors on TRS-80 disk drives are often caused by improper drive speed. Getting the speed reset at Radio Shack means too much down time and trouble to make me happy.

For those bold enough to open the case on the drive (Warning: Opening the case voids any warranties), speed adjustment is rather simple. Both the case and base plate must be removed. Tools needed are a Phillips head screwdriver that fits the case and base plate retaining screws, a jewelers' screwdriver that fits the motor speed control, a bit of clay and a florescent lamp.

First remove the four screws holding the case to the drive. Slip the case from the drive and set it aside. Place the unit upright with the diskette door facing you; the major electronics board will be on your right and the flywheel will be on your left. The motor speed control board, at the rear of the drive between the drive and the power supply, is positioned crosswise to the drive. The power supply is fastened to the back plate.

Place the unit with the flywheel up, diskette removed. Actuate the drive by pushing the reset button on the TRS-80 keyboard. Examine the strobe template on the flywheel under a florescent light. If the 60-cycle pattern appears stationary, the speed is properly adjusted and your read/write errors are caused by other problems than speed control adjustments. On the other hand, if the 60-cycle strobe pattern rotates rapidly or looks like a grey circle, speed adjustment is necessary.

The motor speed control is the rectangular "box" (potentiometer: you gotta admit it looks like a box!) located near the base plate on the flywheel edge of the board. Notice the adjusting screw points towards the base plate. This screw controls the motor speed. Remove the base plate, which is held in place by two screws in the drive unit and two bolts which hold the power supply back plate on.

Once the base plate is removed, the power supply and drive unit have a tendency to separate. Hold the two parts together and place the flywheel side up. Again actuate the drive and adjust the speed control *slowly* until the 60-cycle pattern appears stationary.

Place the drive upside down and loosely fasten the two screws that go into the drive unit. Place a bit of modeling clay (chewing gum will do if you're not particular about aesthetics.) on one of the nuts and put it in place. Start a bolt into it. The nuts come with an attached lock washer so it will hold when tightening. Start the second nut before tightening the first nut. Tighten the drive unit screws first. Now push the power supply and board firmly into the drive unit. Tighten the bolts.

Test the unit for speed before replacing the case. If it passes the strobe test, try the read/write test.

This process is greatly simplified by drilling a 3/4-inch hole in the case to observe the strobe pattern, and by drilling a 1/4-inch hole in the base plate to adjust the speed. The holes should be placed as shown in Figs. 1 and 2. The holes should be dressed with a round file and painted with grey and black paint, respectively.

The next time adjustment is needed, you can simply place the unit on its side, view the strobe through the hole in the case and adjust the speed through the hole in the base plate.

This adjustment and modification will not solve all read/write errors, but if it saves you one trip to Radio Shack, it's worth the time and effort. ■

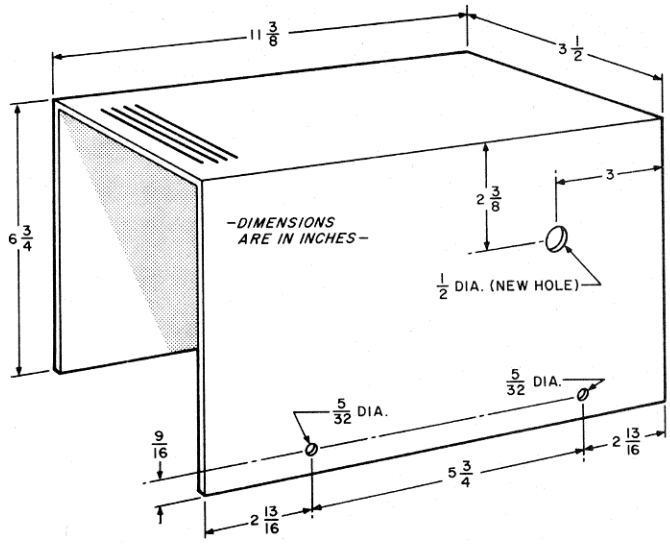


Fig. 1

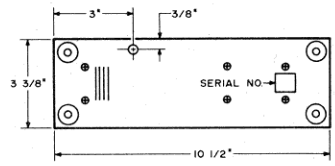
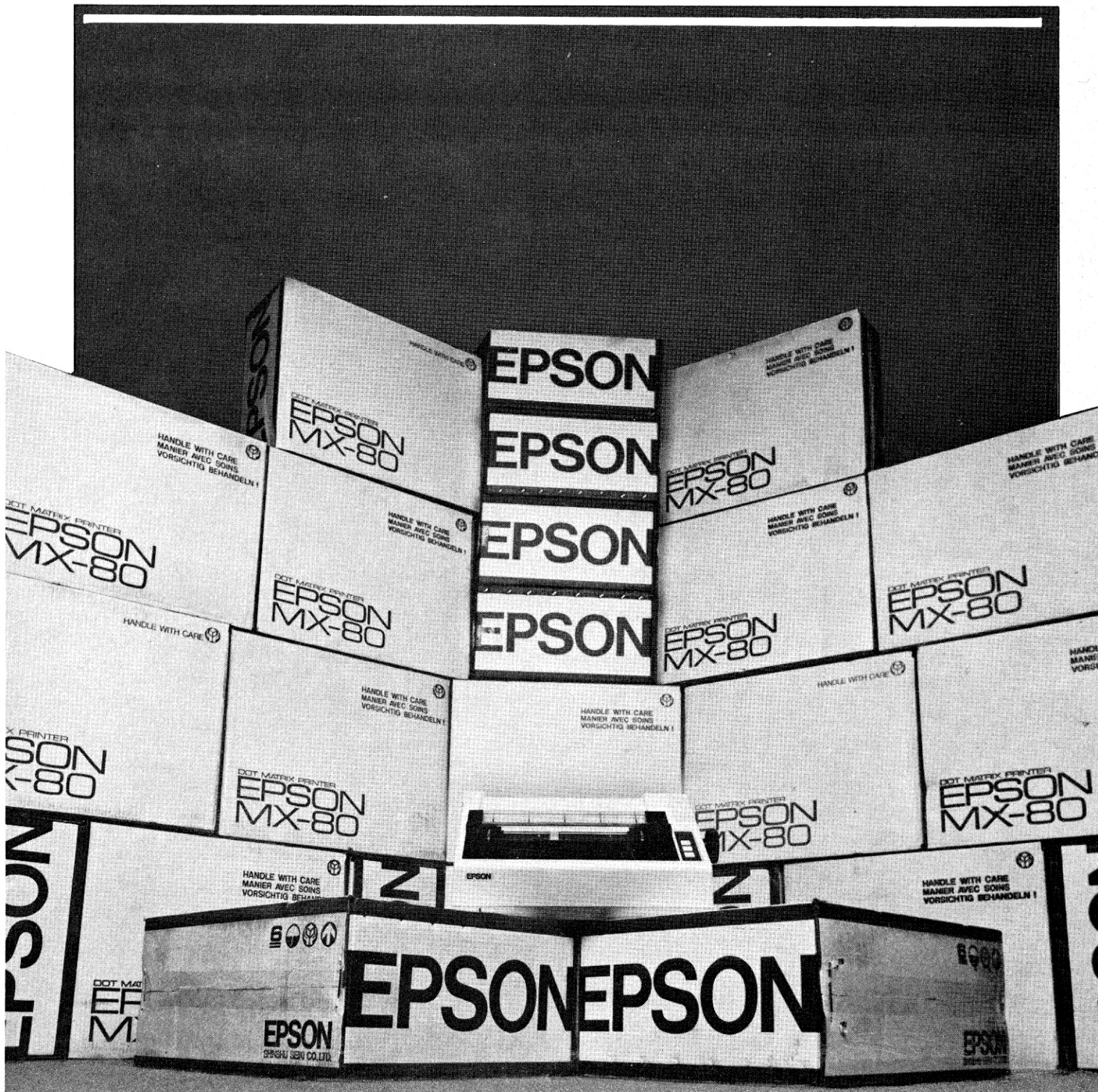


Fig. 2

ALPHA BYTE DOES IT AGAIN...



Call us for our never undersold price.

ALPHA BYTE STORES ✓69

(213) 883-8594

5115 Douglas Fir Road • Suite B • Calabasas, CA 91302

This short subroutine for shift reversal will change your gears.

Shift Lock

Martin C. Hambel
P.O. Box 515
Lisle, IL 60532

The addition of a lowercase conversion, or a printer capable of lowercase output, to the TRS-80 Level II makes it necessary to reverse the shift of alphabetic character output from the keyboard.

The Level II keyboard driver routine generates uppercase ASCII codes in the unshifted condition, but lowercase codes only when the shift key is pressed.

A common remedy is the inclusion of a shift-reversing function in the driver software, for the output device. This solution, while it requires modifying every output driver routine, still leaves the keyboard output reversed.

Problem

The use of a shift-reversing function within the keyboard interpreting software itself is a much better alternative. It would be convenient to have shift lock from the keyboard.

Level II ROM looks to the keyboard device control block in lower RAM to determine the address of the keyboard driver routine. It is found in memory locations 4016H and 4017H. It is possible to write a new keyboard interpreting routine to substitute for that in ROM.

The disadvantage to this is the length of the program required. Because of memory conservation, this approach is discarded and a scheme to add a patch to the ROM routine substituted.

Disassembly of the Level II driver entry routine reveals an instruction at address 03C2H to PUSH the return address 03DDH onto the stack. The instruction at 03DCH causes a jump to the appropriate driver routine, which returns to the saved 03DDH. The driver routine for the keyboard is the one pointed to by the contents of 4016H and 4017H.

The net effect of all this is a CALL to the routine beginning at the address in 4016H and 4017H.

Solution

Adding a short subroutine with the shift reversal function to the ROM driver is done as follows:

- The device control block address is changed to point to a new driver entry module.
- This module alters the return address of the ROM driver routine from 03DDH to a shift reversing subroutine.
- A short shift reversing subroutine is written, ending in a JUMP to the original 03DDH.

The program, SHFTRV, shown in the Program Listing, is organized in three modules. These correspond to the three steps described.

The first module, LOADER, is executed after the program is loaded. This puts the address of the second module (7FDDH in the Program Listing) into the keyboard device control block. It returns to the operating system (1A19H for a non-DOS system).

Next, KBDMD, called every time a keyboard entry is made, removes the return address of 03DDH from the stack. It replaces it with the start address of the shift reverse module, NWDRV (7FE5H in the Listing).

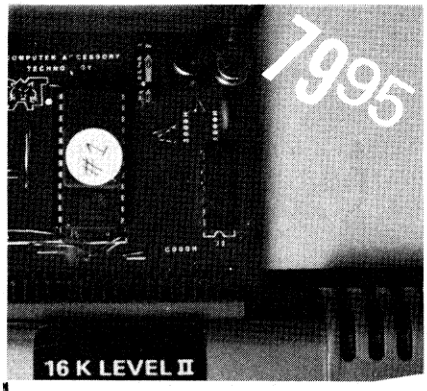
Finally, NWDRV checks for the shift-lock control character. (The shifted down arrow, ASCII code 1AH, is used in the Program Listing but any key or combination not in use, such as the @ with an ASCII code of 40H, can be used if the appropriate change is made to the coding at 7FE6H.)

If the control character is found, the program changes the state of the JUMP instruction at INDIC from conditional to unconditional or vice-versa. Then it proceeds through the shift reversing program steps.

Control, graphic, and numeric characters are returned unchanged, while alphabetic characters are subjected to the shift-reversing operation XOR 20H. Note that when the instruction at INDIC is changed to 18H, the alphabetic characters are returned unchanged.

The program as shown in the Program Listing is assembled into the top 44 bytes of 16K memory. It uses 1AH (shifted down arrow) as the shift lock control character. To use it without modification, prepare a system tape using T-BUG or an assembler program.

The program may be reassembled into any other area of protected memory with appropriate changes to the addresses



KBJ-80 EPROM EXTENDER

Enchance your DISK or Level II basic by installing the KBJ-80. Package includes power supply and firmware module (SYSTAPE). No assembly required!! Firmware module can be used on any kind of EPROM extenders.

(2716-2K) ADDITIONAL FIRMWARE MODULE PRICING:-

SYSTAPE ($39.95)- Adds 9 permanent utilities to Level II basic: system tape Load/Punch and Execute; Repeat keys; Lower case; Abbr. keys; Beeper; Copy and Debounce. (Free with purchase of KBJ-80)

EFL-80 ($59.95)- Used in conjunction with 80-GRAPHIX board provides inverse video w/o using any rams, also includes Debounce; Abbr. keys; Repeat keys and Lower case. A MUST FOR 80-GRAPHIX OWNERS!

KEEPII 3.2 ($39.95)-Latest version from Dennis Kitsz!

TOOLKIT-80 ($39.95)- Add 5 utilities to Level II basic: Renumber; Append; Repeat keys; Debounce and step. You have been programming too long w/o this one!

CURSOR ($24.95)- Full cursor control. You haven't seen any thing like this before!!

IMMEDIATE DELIVERY - CHECK/M.O. TO:
COMPUTER ACCESSORY TECHNOLOGY ✓206
P.O. BOX 2673, KOKOMO, IND. 46901.
TEL:(317)-453-9715
DEALERS INQUIRIES INVITED!!!

"80" SHROUDS

Raise & tilt monitor Cover cabling etc

New...MDX DEMI-CASE...$32.50
P.C. Board mounts inside Shroud

...ofessionally ...neered module of ...rally molded fiberglass

Other Models

LNW DEMI-CASE..*$32.50
LNW SHROUD.....*$27.50
"80" SHROUD.....*$24.50

Add $2.50 shipping & handling

N.Y.S. residents add 7% sales tax

✓358

SYRACUSE R&D CENTER
Box 125, Dewitt, N.Y. 13214
"Specializing in Electronic Packaging"

TRS-80™ SOFTWARE

For The Model I & Model III Computers

MACHINE LANGUAGE SOFTWARE

MONITOR #3 ..... **$39.95**
Disassembler; memory displays, memory move, search verify, and modify; read and write object tapes; hexadecimal arithmetic; object code relocator; unload programs for disk; symbolic output tapes; 41-page instruction manual.

MONITOR #4 ..... **$49.95**
Same as Monitor #3 but adds: save and read disk files; direct input and output of disk sectors; send, receive, or talk to another computer via RS-232-C interface; symbolic disassembly on disk.

SMART TERMINAL **$69.95**
Enables your TRS-80 to be used as a remote terminal to a time-sharing system. Supports lowercase and full range of control keys. Automatic transmission between memory and host computer. Much more.

FASTSORT **$9.95**
Machine-language sorting program for use by Basic programs. Many times faster than other methods!

BASIC SOFTWARE

MAILING LIST **$69.95**
Maintains mailing list files of over 1000 names per diskette. Add, delete, change, find name, machine language sort, print file.

SMALL BUSINESS ACCOUNTING **$49.95**
Based on Dome Bookkeeping Journal #612, keeps track of income, expenditures, and payroll for a small business of up to 16 employees. Daily, monthly, year-to-date summaries.

HOWE SOFTWARE
14 Lexington Road, New City, N.Y. 10956
* TRS-80 is a registered trademark of Tandy Corp. ✓103

DISCOVER THE 6809 IN YOUR COLOR COMPUTER

Now you can explore the Radio Shack Color Computer's impressive potentials—as an inexpensive development system, a color peripheral, a process controller—ad infinitum. The Micro Works introduces these powerful software tools for utilizing the color computer at the assembly language level.

MONITOR TAPE: A cassette tape which allows you to:

- Examine or change memory using a formatted hex display
- Save areas of memory to cassette in binary (a "CSAVEM")
- Download/upload data or programs to a host system
- Move the video display page throughout RAM
- Send or receive RS-232 at up to 9600 baud
- Investigate and activate features of your computer, such as hi-res graphics or machine-language music
- Use your color computer as an intelligent peripheral for another computer, a color display or a 6809 program development tool

The monitor has 19 commands in all, and is relocatable and re-entrant.

80C Monitor Tape Price: $29.95

MONITOR ROM: The same program as the monitor tape, supplied on ROM. This allows BASIC to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The ROM plugs into the Extended Basic ROM Socket or a modified ROMPACK.

80C Monitor ROM Price: $39.95

C BUG IS HERE!!

INSIDE THE COLOR COMPUTER: This package is a disassembler which runs on the color computer and enables you to generate your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. Disassembler features include cross-referencing of variables and labels; output code which can be re-assembled; output to an 80-column printer, small printer or screen; and a data table area specification which defaults to the table boundaries in the interpreter ROM. A 16K system is required for the use of this cassette.

80C Disassembler Price: $49.95

THE MICRO WORKS ✓109

Mastercharge and BankAmericard

P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

✓See List of Advertisers on page 306

in the Listing. Also, care must be used in selecting an alternate control character, as the driver routine returns the control character in the A register. It will print, if it is a printable character. The 1AH code selected is not recognized by many printers. Another possibility is the shift—down arrow—B combination, which returns 02H.

In the event that other keyboard routines such as debounce are desired, they may be linked into the program by changing the address at 7FE2H to point to the start of the desired additional routine.

Operation

Load the program tape upon power-up, after answering MEMORY SIZE? with 32723. Execute it using /ENTER. Unshifted key entries will then be output as lowercase ASCII codes. Shifted entries will be uppercase. Each time the shifted down-arrow is pressed, the keyboard output will toggle between normal or reverse shift, and vice-versa. ■

```
                00100 ;      SHFTRV - A PROGRAM TO PERMIT SHIFT-REVERSAL
                00110 ;               OF THE ALPHABETIC KEYBOARD OUTPUT
                00120 ;               UNDER SOFTWARE CONTROL.
                00130 ;
7FD4            00140          ORG     7FD4H
                00150 ;
7FD4 21DD7F     00160 LOADER   LD      HL,KBDMD     ;LOAD HL WITH ADDRESS OF
                00170 ;                              KEYBOARD DRIVER MOD
7FD7 221640     00180          LD      (4016H),HL    ;PUT IT INTO "ROM SWTCHBRD"
7FDA C3CC06     00190          JP      6CCH         ;RET TO BASIC
                00200 ;                              1A19H FOR LEVEL II BASIC
                00210 ;
7FDD E1         00220 KBDMD    POP     HL           ;CLEAR ORIG DRVR RET ADDR
                00230 ;                              (03DDH) FROM STACK
7FDE 21E57F     00240          LD      HL,NWDRV     ;ADDRESS OF SHIFT-REVERSING
                00250 ;                              SUBROUTINE
7FE1 E5         00260          PUSH    HL           ;PUT IT ON THE STACK AS THE
                00270 ;                              NEW DRIVER RET ADDRESS
7FE2 C3E303     00280          JP      03E3H        ;BACK TO ROM DRIVER ROUTINE
                00290 ;
7FE5 FE1A       00300 NWDRV    CP      1AH          ;SHIFTED DOWN-ARROW?
7FE7 200A       00310          JR      NZ,SHIFT     ; NO-DO SHIFT REVERSAL
7FE9 F5         00320          PUSH    AF           ;  YES-SAVE CHAR. TO DSPLY
7FEA 3AF57F     00330 LOCK     LD      A,(INDIC)    ;GET REL JP INSTR (38 OR 18)
                00340 ;                               FROM SHIFT REVERSAL ROUTINE
7FED EE20       00350          XOR     20H          ;FLIP-FLOP IT (38/18 OR 18/38)
7FEF 32F57F     00360          LD      (INDIC),A    ;PUT IT BACK
7FF2 F1         00370          POP     AF           ;RESTORE CHAR TO BE PRTD
7FF3 FE41       00380 SHIFT    CP      41H          ; LESS THAN U.C. "A"?
7FF5 3806       00390 INDIC    JR      C,RET        ;RETURN IF SO, (OR RET ANYWAY
                00400 ;                               IF ROUTINE CHANGED THIS
                00410 ;                              ;  INSTR TO "18  06"
                00420 ;
7FF7 FE7B       00430          CP      7BH          ; GREATER THAN L.C."Z"?
7FF9 3002       00440          JR      NC,RET       ;RETURN IF SO
7FFB EE20       00450          XOR     20H          ;ELSE, CHANGE SHIFT
7FFD C3DD03     00460 RET      JP      03DDH        ;RET TO ORIG ROM RET ADDRESS
7FD4            00470          END     LOADER       ;WRITE ENTRY-POINT ADDR
00000 TOTAL ERRORS
```

Program Listing

DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?

Don't Blame The Software!

Power Line Spikes, Surges & Hash could be the culprit!
Floppies, printers, memory & processor often interact! Our unique ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash.

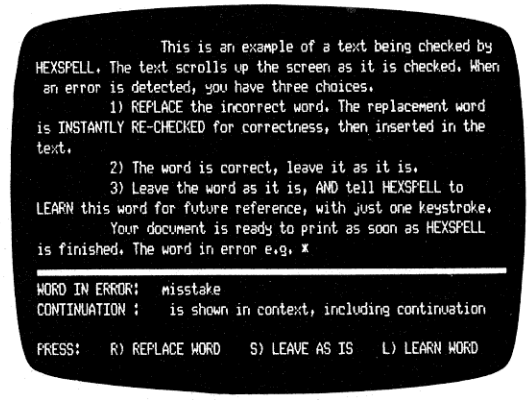
- **ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket $62.95**
- **ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank $62.95**
- **SUPER ISOLATOR (ISO-3), similar to ISO-1 except double filtering & Suppression $94.95**
- **ISOLATOR (ISO-4), similar to ISO-1 except unit has 6 individually filtered sockets $106.95**
- **ISOLATOR (ISO-5), similar to ISO-2 except unit has 3 socket banks, 9 sockets total $87.95**
- **CIRCUIT BREAKER, any model (add-CB) ..... Add $ 8.00**
- **CKT BRKR/SWITCH/PILOT (-CBS) ..... Add $16.00**

Master-Charge, Visa, American Express
Order Toll Free 1-800-225-4876
(except AK, HI, MA, PR & Canada)

ESP Electronic Specialists, Inc.
171 South Main Street, Natick, Mass. 01760
Technical & Non-800: 1-617-655-1532 ✓58

Word Processing? You need a

SPELLING CHECKER



HEXSPELL

zaps those ~~snaeky~~ sneaky typos

HEXSPELL shows you the errors right where it finds them, then instantly checks your corrections to make sure they ARE correct! When HEXSPELL is finished the corrected document is ready for printing. HEXSPELL comes with a 20,000 word list, with room for 8000 more! Just one keystroke teaches HEXSPELL a new word. You can even clear the memory and teach HEXSPELL a complete new language.

Programs, wordlist & manual $69US. Manual only $12.

Requires 48K TRS-80 Mod I with 2 Drive & TRSDOS.
Tested against Scripsit & Electric Pencil, should work with most word processors.

TRS-80, Scripsit are trademarks of Tandy Corp.
Electric Pencil is a trademark of Michael Shrayer Software.

✓125

HEXAGON SYSTEMS
P.O. Box 397, Station A
Vancouver, B.C. Canada V6C 2N2
Telephone (604) 682-7646

N E W PEN737

FINALLY - THE ULTIMATE IN WORD PROCESSING FROM COMPUTEX

Superscripts / Subscripts / Underlines / **Elongated** printing / BOLD face type and many other features can now be accomplished with your TRS80 computer, Electric Pencil, Centronics 737 Printer and our new PEN737 program.

PEN737 program (available on disk or cassette) $29.95
When purchased with Centronics 737 printer $19.95

CENTRONICS 737 PRINTER
Special $750.00

FEATURES: Fan fold, roll and single sheet paper handling • True underlining capabilities • Superscripts and Subscripts • True UPPER & lower case • 80 or 132 column lines • Fast 80 cps printing • Paper forward and reverse switch • Supports 10 and 16.7 c.p.i

TRS80 MODEL I or MODEL III PRINTER CABLE $29.95

16K MEMORY EXPANSION KITS FOR MODEL I AND MODEL III SYSTEMS
$35.95/kit 2-5 kits $32.95/kit 6 up $29.95/kit

LNW EXPANSION I/F and COLOR COMPUTER KITS

COMPLETE LNW EXPANSION INTERFACE
..... $249.00

Includes all components, sockets, and hardware to build the complete kit. Does not include the relay for dual cassette, cabinet or Ram.

RAM MEMORY $29.95/16K WHEN PURCHASED WITH LNW

Complete CPT Systems with disk drive, 32K Ram, RS232 and Custom cabinet as low as $799.00
(CALL FOR QUOTE)

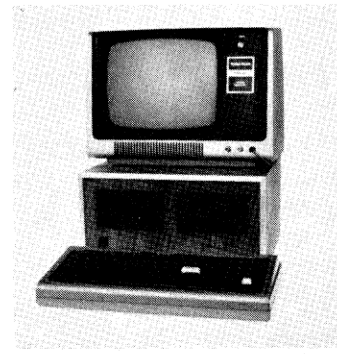
LNW COLOR Computer Kit $599.00

Includes all components to assemble the LNW Color Computer including: High Resolution Video Ram and 16K user ram, Keyboard, and Level II compatible Roms.

CUSTOM CABINET FOR LNW COLOR COMPUTER AND EXPANSION I/F $149.95

CUSTOM CABINET FOR LNW EXPANSION I/F, AND DISK DRIVES ..... $ 99.95

We also stock a complete line of components for both the LNW Color Computer and the LNW System Expansion at NEVER UNDERSOLD PRICES



TRS80 is a registered trade mark of Radio Shack
Certified Checks, Money Orders
Or call to arrange direct wire transfer
Visa and Mastercharge accepted, add 4% to order.
Personal or company checks require 2 weeks to clear.

COMPUTEX ✓392
15502 Highway 3, Suite 715
Webster, Texas 77598
(713) 488-8022

DISK DRIVES - Compare !!!!

RELIABILITY / FEATURES / WARRANTY
PRICE / DELIVERY
Computex offers the best of all with TANDON Disk Drives

Warranty: 120 day repair / replace warranty
Reliability: 8000 hrs. mean time between failure
Features: 5 m.s. Track to Track Access Time
0 sec. Head load time (no solenoid either!)
Single or Double Density Capabilities
40 / 80 Track - Single & Double Sided
Maintenance Manual Provided with drive

TM100-1 Single headed 40 track disk drive, unformatted double density storage = 250 KB
TRS80tm Storage single density = 102 KB Double = 184KB
Bare drive $225.00 **With case/supply $299.95**

TM100-2 Double headed 40 track drive, unformatted double density storage = 500 KB
TRS80tm Storage single density = 204KB, Double = 367KB
Bare drive $345.00 **With case/supply $419.95**

TM100-3 Single headed 80 track drive, unformatted double density storage 500KB
TRS80tm Storage single density = 204KB, Double = 367KB
Bare drive $375.00 **With case/supply $449.00**

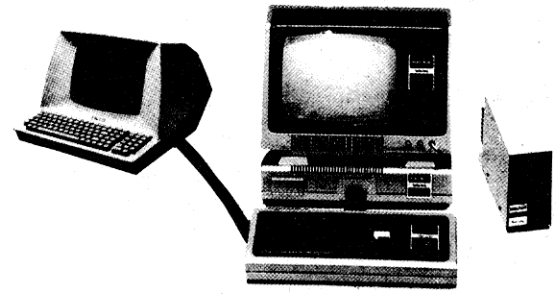
TM100-4 Double headed 80 track drive, unformatted double density storage = 1.0mB
TRS80tm Storage single density = 408KB, Double = 735KB
Bare drive $475.00 **With case/supply $549.00**

2 Drive Disk Cable $24.95
4 Drive Disk Cable $34.95
Drive Extender Cable $13.95

MODEL III DISK DRIVE KITS

Complete kit installs in minutes, Interfaces any Tandon disk drive to your Model III, Detailed instructions included **$429.95**

TWO USER MULTI-TASKING



$89

TSHARE VI. 3
A SPLIT PERSONALITY FOR YOUR TRS – 80 MODEL I

- Interrupt driven executive patches to parent operating system NEWDOS 2.1 or TRSDOS 2.3.
- Allows two active users to share a single TRS-80.
- Execute BASIC or MACHINE LANGUAGE (above 7700 Hex).
- Joint access of disk files.
- Second user ties to HOST via modem, terminal, or 2nd TRS-80.
- Options for Expansion Interface, RS-232, TRS232, or HUH interface.
- SIMPLEX MODE for non serial-port users. Requires only a printer to act as second "screen". Jobs share the keyboard under user control.
- CONFIGURE UTILITY partitions memory usage and selects I/O.

$49

DBM5
MULTI – FEATURE DATA MANAGER

- Up to 20 user defined fields.
- Files extend across multiple diskettes.
- Supports up to four drives.
- Automatic single drive disk mount requests.
- Four data types and computational fields.
- Flexible REPORT GENERATOR.
- Fast assembly language sorts.
- MULTI-FIELD sorts and searches.
- Keyed access on any sorted field.
- Indexed relations between files.

TRS-80 tm Radio Shack/Tandy Corp.
NEWDOS tm Apparat, Inc.
TRS232 tm Small System Software
HUH tm California Computer Systems.

TO ORDER

ComSoft
203 ARDEN STREET ✓204
GLENDALE, CA 91203
(213) 649-0369

✓See List of Advertisers on page 306

A speedy quick sort utility for your lists of names.

The Spare Time Generator

Thomas C. Mehesan, Jr.
1210 Kahler Court
Sheldon, IA 51201

What do you do while your micro is sorting that membership or mailing list into alphabetical order?

I used to sit and watch the blank screen and wonder just where it was hung up. Or if I should break in to see if all is well.

Well, I got tired of it. So I started looking for a way to build a better lettertrap. Here's what I found.

Common Routines

Several sorting routines are used on a microcomputer. The most common are the Ripple sort, Modified Ripple sort, Bubble sort, and the Shell-Metzner routine. (See "5 Minutes or 5 Hours," by Doyle, *Kilobaud,* May, 1978.)

The fastest is the Shell-Metzner, see Program Listing 1. Using this particular routine you can sort 150 numbers from reverse to ascending order in 36 seconds.

Dealing with string sorts is a different matter, and often 30 minutes is common for sorting a list of 150 names alphabetically.

With Qwik sort, however, the total time to load and sort 150 names for a membership list is *less* than three minutes. On top of that, the screen keeps you informed of just what the CPU is up to.

Program Description

In our example, the membership list is entered and kept on disk in a file buffer. The buffer consists of two sub-records accessed by membership number. The first two fields of the buffer (Program Listing 2, line 150) after the dummy, provides the information, name (NM$) and membership number (NR$). The information allows the sort to be performed and will reaccess the files to print the final list.

Name consists of 20 bytes, last name first—space—first name or initials. Membership number is kept on disk as the two-byte string representation of the number value.

In Quick sort each name is loaded into a sorted 26 × 30 array (B$(26,30) using the first letter of the last name to index "row". You can index up to 30 names in each row, each starting with the same letter. This will accomodate a list of 200 names. For a larger list, simply increase the size of the array and its companion (A(26,30)), which holds the related membership number.

After the arrays are built, a Shell-Metzner routine sorts only the entries in each row of array B$(26,30) but switches both arrays simultaneously. This reduces the number of switches necessary in sorting by a factor of perhaps 10X.

When each row is sorted, the final results are posted from the companion array to a master list of membership numbers (L(N)). The printing information is drawn from this. Some additional memory could be saved by eliminating the master list and printing from the companion array.

In any event, now you have a program which allows you to sort a list of 150 names in reasonable time. It uses only 12243 bytes to load the program and execute it. (It takes 32 bytes for each additional name.) This program can perform an in-memory sort of more than 250 names with only 16K memory or more than 425 names with 32K and a disk.

Program Analysis

Now to the fun stuff.

Lines 50-70 inform the hardware of the number of names that must be sorted. To do this simply go to LOF(1) and see if both halves are occupied. Remember, the total number of names is either the second subrecord (NR$) or, if that value is zero, 1 + (2*(LDF(1) – 1)). If you're using a cassette, just place your name and number files into B$(26,30) and A(26,30).

When using cassette or sequential disk input, you may have to set up other companion arrays to handle final output to the print routines. It may be impractical to go back to your files for other information about

Program Listing 1. Shell-Metzner Sort

```
250 ' ***** SHELL-METZNER SORT ROUTINE *****
260 M=R(Q)-1
270 M=INT(M/2)
280 IF M=0 THEN 420
290 J=1:K=(R(Q)-1)-M
300 I=J
310 L=I+M
320 IF B$(Q,I)<=B$(Q,L) THEN 380
330 T$=B$(Q,I):B$(Q,I)=B$(Q,L):B$(Q,L)=T$
340 G=A(Q,I):A(Q,I)=A(Q,L):A(Q,L)=G
350 I=I-M
360 IF I<1 THEN 380
370 GOTO310
380 J=J+1
390 IF J>K THEN 270
400 GOTO 300
```

Program Listing 2. Qwik Sort

```
10 ' ***** ALPHABETICAL SORTING PROGRAM *****
20 CLS:CLEAR 5000
30 PRINT:PRINTTAB(20)"ALPHABETICAL MEMBERSHIP LIST"
```

Program continues

```
40 PRINT:INPUT"PRESS <ENTER> TO START SORT";Z
50 ' ***** DETERMINE NUMBER OF NAMES TO SORT *****
60 OPEN "R",1,"MLIST :1":GET 1,LOF(1):FIELD 1,128 AS DM
     $,2 AS NR$
70 IF CVI(NR$)<1 THEN N1=1+(2*(LOF(1)-1)) ELSE N1=CVI(N
     R$)
80 DEFINT L, A
90 ' ***** DIMENSION ARRAYS *****
100 DIM A(26,30), L(N1), R(30), B$(26,30)
110 ' ***** LOAD NAMES AND MEMBERSHIP NUMBERS TO ARRAYS
     *****
120 CLS:PRINTTAB(10)"WORKING":FOR J=1 TO 26:R(J)=1:NEXT
     J
130 PRINT"RETRIEVING DATA #"
140 FOR N=1 TO N1:PRINT @ 81, N:PR%=INT((N-1)/2)+1:SR%=
     N-(2*(PR%-1))
150 GET 1,PR%:FIELD 1, ((SR%-1)*128) AS DM$, 2 AS NR$,
     20 AS NM$
160 J=ASC(LEFT$(NM$,1))-64
170 A(J,R(J))=CVI(NR$):B$(J,R(J))=NM$:R(J)=R(J)+1:GOTO1
     80
180 NEXT N:J=0:N=0:R=0:CLOSE
190 ' ***** SORTING ARRAY ELEMENTS *****
200 PRINT:PRINT:PRINT"SORTING  `"
210 P=0
220 FOR Q=1 TO 26:PRINT @ 267, CHR$(Q+64)
230 IF A(Q,1)=0 GOTO450
240 IF A(Q,2)=0 THEN P=P+1:L(P)=A(Q,1):GOTO 450
250 ' ***** SHELL-METZNER SORT ROUTINE *****
260 M=R(Q)-1
270 M=INT(M/2)
280 IF M=0 THEN 420
290 J=1:K=(R(Q)-1)-M
300 I=J
310 L=I+M
320 IF B$(Q,I)<=B$(Q,L) THEN 380
330 T$=B$(Q,I):B$(Q,I)=B$(Q,L):B$(Q,L)=T$
340 G=A(Q,I):A(Q,I)=A(Q,L):A(Q,L)=G
350 I=I-M
360 IF I<1 THEN 380
370 GOTO310
380 J=J+1
390 IF J>K THEN 270
400 GOTO 300

410 ' ***** LIST SORTED NAMES TO PRINTING ARRAY *****
420 FOR N=1 TO R(Q)-1
430  P=P+1:L(P)=A(Q,N)
440 NEXT N

450 NEXT Q
460 GOTO 630
470 END
480 ' ***** SCREEN PRINT SORTED LIST *****
490 CLS:PRINTTAB(20)"MEMBERSHIP LIST"
500 PRINTTAB(10)"NAME";TAB(28)"NUMBER";TAB(41)"TYPE";TA
     B(50)"PHONE"
510 OPEN"R",1,"MLIST":Q=0
520 FOR N=1 TO N1
530 IF L(N)=0 GOTO 600
540 PR%=INT((L(N)-1)/2)+1:SR%=L(N)-(2*(PR%-1))
550 GET 1,PR%:FIELD 1,((SR%-1)*128) AS DM$, 2 AS NR$, 2
     0 AS NM$,
66 AS NU$, 40 AS RM$
560 PRINTTAB(5)NM$;TAB(30);USING"###";CVI(NR$);:PRINTTA
     B(40)LEFT$(RM$,18)
570 Q=Q+1
580 FOR J=12 TO N1 STEP 15:IF J=Q INPUT"PRESS <ENTER> F
     OR MORE";Z
590 NEXT J
600 NEXT N:CLOSE
610 INPUT"PRESS <ENTER> TO CONTINUE";Z
620 ' ***** SELECT PRINTING MODE *****
630 CLS:PRINT:PRINT:PRINT"SELECT AS FOLLOWS:"
640 PRINTTAB(10)"1. REVIEW LIST":PRINTTAB(10)"2. PRINT
     HARD COPY"
650 PRINTTAB(10)"3. END
655 INPUT Z
660 IF Z<>1 AND Z<>2 AND Z<>3 GOTO 630
670 ON Z GOTO 490  ,680  ,840
680 CLS:PRINT"MAKE SURE LINE PRINTER IS ON AND SET TO P
     RINT"
690 PRINT:INPUT"ENTER TODAY'S DATE (##/##/##): ";DA$
700 PRINT:INPUT" PRESS <ENTER> TO PRINT";Z
710 LPRINTTAB(30)"NAME OF LIST"
720 LPRINTTAB(27)"MEMBERSHIP LIST -- ";DA$
730 LPRINT,CHR$(10):LPRINTSTRING$(75,"=")
740 LPRINTTAB(15)"NAME";TAB(38)"NUMBER";TAB(47)"TYPE";T
     AB(57)"PHONE"
750 LPRINTSTRING$(75,"-")
760 OPEN"R",1,"MLIST"
770 FOR N=1 TO N1:J=L(N)
780 PR%=INT((J-1)/2)+1:SR%=J-(2*(PR%-1))
790 GET 1,PR%:FIELD 1,((SR%-1)*128) AS DM$, 2 AS NR$, 2
     0 AS NM$,
66 AS NU$, 40 AS RM$
800 LPRINTTAB(10)NM$;TAB(40);USING"###";CVI(NR$);:LPRIN
     TTAB(46)RM$
810 NEXT N:CLOSE
820 GOTO630
830 END
840 STOP:' *** OR RETURN TO MENU ***
```

each name.

Lines 140-180 load the two arrays, B$(26,30) and A(26,30), from disk, sorting by the first letter as they go. The membership number is displayed on the screen as each file is loaded. The formula J = ASC(LEFT$ (NM$,1))-64 performs this. We all know that the ASCII value for A is 65 and values increment up by 1s from there. (When sorting lowercase strings substitute 97 for 64 in the formula. Remember, the names are on disk by last name first.) Already you have sorted the entire list by first letter as you load it, and the whole process took only 42 seconds!

After everything is neatly in the arrays, it's important to find out how many entries there are in each row. No need to sort one entry, is there? We could look at the pointer (R(J)) you created in line 120 (to tell the CPU where to put the next entry in the row). It seems simpler, however, to look at the first and second entries in lines 230 and 240. If there is no entry, (no name with that first letter in the list) skip to the next row. If there is only one entry, shown by the second entry equaling zero, post this entry directly to the master list. No sort is necessary. The pointer for the master list (P(N)) at lines 210, 240 and 430 will put this posting in proper sequence.

If you fail the tests in lines 230 and 240, go right into the Shell-Metzner sorting routine, lines 200-400. Notice that at lines 200 and 220 there is some screen activity indicating which letter the CPU is handling. This tells you the program hasn't crashed.

After sorting each row, the rearranged entries in A(26,30) are posted to the master list at lines 400-440. At line 450 you can jump back to start the process for the next letter.

When you hit line 460, you are done sorting. Surprise. . . only 2 minutes and 42 seconds have elapsed.

Your biggest problem, after you print out your nice new list (lines 490 to end), is to figure what you're going to do with all that spare time.■

computer case company

comp case

• RS205

• AP101	Apple II with Single Disk Drive	$109
• AP102	Apple II with Double Disk Drives	119
• AP103	Apple II, 9 inch Monitor & Double Drives	129
• AP104	Apple ///, two additional Drives & Silentype	139
• AP105	12 inch monitor plus accessories	99
• RS201	TRS-80 Model I, Expansion Unit & Drives	109
• RS202	TRS-80 Monitor or TV set	84
• RS204	TRS-80 Model III	129
• RS205	Radio Shack Color Computer	89
• P401	Paper Tiger 440/445/460	99
• P402	Centronics 730/737 - Line Printer II/IV	89
• P403	Epson MX70 or MX80	89
• CC90	Matching Attaché Case	75

✓199

computer case company

5650 INDIAN MOUND CT. COLUMBUS, OHIO 43213 (614) 868-9464

✓See List of Advertisers on page 306

Hardware to speed up cassette I/O.

The FCI-80 and the TC-8

TC-8
JPC Products, Inc.
Albuquerque, NM
$120

FCI-80
Personal Micro Computers, Inc.
Mt. View, CA
$188

by Harley Dyk
1644 Grant
Grand Haven, MI 49417

Owners of cassette based TRS-80 computers have four mass-storage options: Disks, tape units, speed-up devices for cassette, and simple cassettes. The advantages of disk have been fairly well publicized; the May issue of *80 Microcomputing* ran an article on the Stringy Floppy and Beta-80, and there is little to write about the slow and not too reliable TRS-80 Cassette Operating System (COS). This article looks at two ways to speed up tape storage and make it more reliable. The products under consideration are the FCI-80 by Personal Micro Computers Inc., and the TC-8 by JPC Products, Inc.

FCI-80

The FCI-80 takes a novel approach to increasing cassette load speed. Rather than increasing the density of tape data, the tape is moved faster. Programs are saved as usual at the normal speed, but when one wants to load a program using the FCI-80, fast forward and play are pressed simultaneously on a modified CTR-41 recorder. This increases load speed to a minimum of 6000 baud (about 12 times the conventional load speed).

The FCI-80 connects to the keyboard with a 40-conductor ribbon cable, connects to a 9V AC power adapter, and plugs into the earjack on the recorder. The unit is about the size of the recorder and is designed to be placed under the recorder.

The operating system is in ROM at address 12288 (3000 H), an area just above Level II BASIC called reserved. After turning the computer on, simply type SYSTEM followed by /12288 to make the FCI-80 functional. To load a conventionally saved program, type LOAD. This clears the screen and displays the question: BASIC(B) OR SYSTEM(S)? After answering, you can specify a program name, and finally the message PRESS PLAY & FFWD ON THE TAPE DECK is displayed.

Volume must be at maximum; the break key will get you back to BASIC at any time. Since fast forward and play must work together, the recorder must be modified. You can purchase such a recorder, or full instructions come with the FCI-80 to modify your CTR-41.

Loading speed is almost unbelievable for an audio cassette. The speed is not fixed since the fast forward speed of a tape increases as the size of the take-up reel increases. I was not able to get the unit to work near the end of a 300 ft. tape, but it worked fine from the beginning through at least the 100 ft. point. This means you should be able to use tapes with at least 10 minutes per side.

At its slowest, the FCI-80 loaded a 14K program in 16.5 seconds. The program took 228 seconds with TRS-80 COS, a speed-up factor of more than 13. I also tried a 4.3K program at the beginning of a tape and it loaded in about 5.7 seconds. I recorded the same program at about the 100 ft. point of the tape and was able to load the program in 3.9 seconds, which is nearly 9000 baud (a speed-up factor of nearly 18).

Due to the speed of the FCI-80, cassette head alignment is very important. I was not initially able to get tapes I had recorded or purchased programs to load. I rerecorded these programs on the modified CTR-41 and then they loaded without problem. I could have elected to try to match the head alignment to my tapes.

The unit is ideal for someone who frequently uses large programs but rarely saves them. The unit does load programs rapidly, but I feel two very important features are missing. Programs must be saved at the same slow speed, and writing data to tape (one of the weakest features of TRS-80 COS) has not been changed.

One nice additional feature of the FCI-80 is that a keyboard debounce program is also in ROM at address 12800 (3200 H). This program also provides automatic key repeat when a key is held down, and will beep when you press a key if the cassette output plug is connected to an amplifier.

	TC-8	FCI-80
Cost	$90 kit, $120 assembled, $3.50 for postage and handling	$188, plus $25 for cable plus $8 for power pack, add $95 for modified CTR-41 if needed. Prices include shipping.
Size: W x L x H	4" x 5.5" x 2.75"	5.25" x 10.25" x 2"
Operating System	In RAM—takes about 1.3 k	In ROM at 12288 (3000 H)
Warranty	60 day	90 day, 30 day money back
Keyboard Debounce	Yes	Yes
Contact	JPC Products Inc. Albuquerque, NM 87112	Personal Micro Computers Inc. Mt. View, CA 94043
Speed	2400 baud	6000-9000 baud load only

Table 1. Comparison table.

COMPUTER EQUIPMENT & SOFTWARE BARGAINS

EVERY MONTH

BUY, SELL OR TRADE ALL TYPES OF COMPUTER EQUIPMENT AND SOFTWARE (pre-owned and new) among 20,000 readers nationwide.

FEATURES:

- Low classified ad rates - 10¢ a word
- Hundreds of ads from individuals
- Categorized ads so you can find them instantly
- Large (11 by 14") easy to read pages

Subscribe now for $10 and receive 13 issues/year (one FREE plus 12 regular issues). After receiving your first issue if you're not completely satisfied you may have a 100% refund and you still keep the first issue free. Bank cards accepted.

BONUS: *If you have something to advertise (pre-owned or software) send in a classified ad with your subscription and we'll run it FREE.*

The Nationwide Marketplace for Computer Equipment

COMPUTER SHOPPER ✓212

P.O. BOX F27 • TITUSVILLE, FL 32780 • 305-269-3211

MasterCard & VISA subscriptions only, call **TOLL FREE 1-800-528-6050 Ex. 184**.

STOCK MARKET SOFTWARE

By H & H Trading Company for Mod. I, II, & III TRS-80®s

STOCK TRACKER™ times trades on individual stocks and options. Uses a technical volume analysis. Completely objective. Gives buy, sell signals.

MARKET TRACKER™ times tops & bottoms on the Dow Industrials; a composite of six technical indicators. Some judgement required. Gives buy, sell signals.

These two programs are accurate.

Hundreds of satisfied users.

ASK FOR THE EVIDENCE!

FOR MORE INFORMATION OR TO ORDER, CONTACT:

H & H TRADING COMPANY

POST OFFICE BOX 23546
PLEASANT HILL, CALIFORNIA 94523
Telephone 415/937-1030

✓223

VISA & MASTERCARD

®Regd. T.M. of Radio Shack ©

New!

For TRS-80 Basic Programmers...A Way To Get Your Basic Programs Working Fast

BasicPro!!

BasicPro Saves Hours of Programming Drudgery

Write and debug your BASIC programs faster. With Basic Pro you get 12 powerful programming aids that let you instantly:

- MOVE or COPY code
- RENUMBER lines
- RENAME variables
- JOIN programs together

And more! You also get a handy CROSS REFERENCE list that shows you where every variable is used. BasicPro even has a SPEED-UP option that makes your code run faster.

BasicPro Is Easy To Use.

Just select what you want to do from the command menu. You never get stuck with BasicPro. Just use the unique HELP command. BasicPro provides plenty of prompt messages to guide you through any programming session.

BasicPro comes complete with instruction booklet. Start enjoying effortless programming! Order BasicPro today! **$24.95**

Also New...VisiCom - The Visible Computer

Learn Machine Language Programming Fast with VisiCom. VisiCom turns your TRS-80 into a simple computer with registers and memory displayed. VisiCom's small set of machine language instructions is easy to use. You start writing machine language programs immediately.

See Your Machine Language Programs Running "Inside" VisiCom. You see data move in and out of registers and memory as VisiCom executes each instruction. It's EASY to learn machine language programming when you can SEE what every instruction does.

VisiCom comes with instruction manual.

Start learning machine language programming the fast, fun way! Order VisiCom today **$19.95**

Special Offer! Act NOW and SAVE 20%
By ordering BOTH BasicPro and VisiCom,
you pay just $35.95 (reg. $44.95)

Both BasicPro and VisiCom require TRS—80 level II and (16K) memory and are available on tape cassette.

SOFTWORX, INC. P.O. Box 9080, Seattle, WA 98109

✓289 8M-2

Please send me the items checked below

☐ BasicPro $24.95
☐ VisiCom $19.95
☐ BasicPro & VisiCom $35.95

Name _____

Address _____

City _____

State _____ Zip _____

Enclose check or money order and mail this coupon to:
Softworx, Inc. P.O. Box 9080, Seattle, WA 98109
Or Charge to:

Visa# _____ Mastercharge# _____

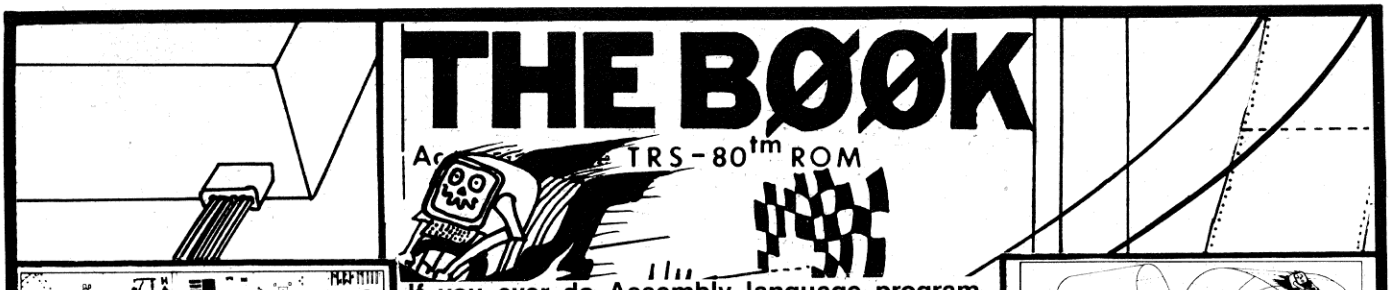
Cardholder Signature _____

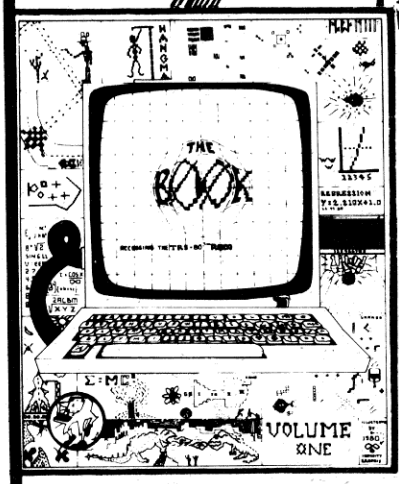
Expiration Date _____

Visa and Mastercharge customers may call (206) 284-7388

✓See List of Advertisers on page 306

THE BØØK





If you ever do Assembly language programming, or you just want to know more about your TRS-80 ROM, "THE BOOK"s are for you.

*TRS-80 is a trademark of Tandy Corp.

Each volume is priced at: $14.95 + $1.50 S&H = $16.45 ($17.05 in VA) Overseas add $2.50 for air shipment

Insiders Software Consultants, Inc. ✓305
P.O. Box 2441, Dept. SUM2
Springfield, VA 22152

☐ **Please send me Volume I of THE BOOK**

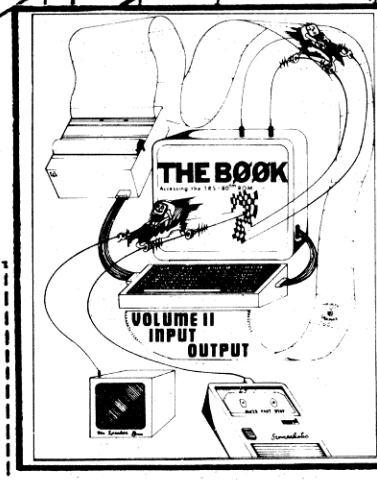
☐ **Please send me Volume II of THE BOOK**

NAME _____
ADDRESS _____
CITY, STATE _____ ZIP CODE _____

☐ Check payable to Insiders Software Consultants, Inc.
☐ MASTER CHARGE MC Bank Code
☐ VISA Exp. Date _____ Card Number _____

Signature _____

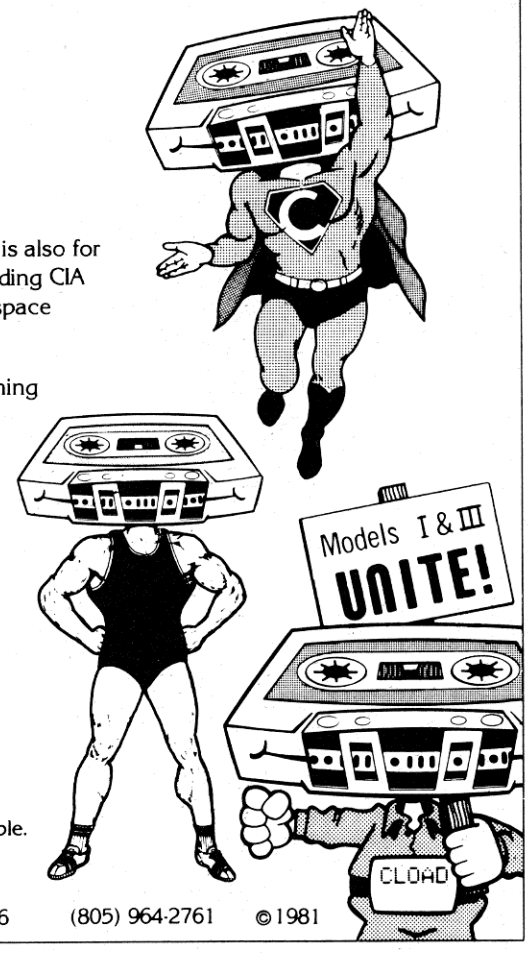
Dealer Inquiries Invited



Volume I: The most comprehensive book yet on the math routines in Level II ROM, Models I & III. Includes a fully commented listing from 0708H to 1607H and an incredibly complete map of the ROM and reserved areas of RAM.

Volume II: Everything you want to know about the video, keyboard, cassette, and printer driver routines. Learn how to write your own! Remarkably detailed listings illustrate well-commented source code. Complement Volume I, now.

WE'RE EXCITED . . .



CLOAD MAGAZINE, the cassette magazine for your **TRS-80** Model I, is also for your TRS-80 Model III! Over 90% of the monthly offerings on cassette (including CIA Adventure, Hustle, States Quiz, RAM Test, and Alien — a machine language space invader-type game) will load and run on the Model III directly.

Now you Model I'ers and Model III'ers can both spend your time RUNning programs, rather than ENTERing and EDITing them. Each tape contains 6 to 8 ready-to-**CLOAD** fun, educational, and practical programs, delivered to your door by First Class Mail each month.

Join Clyde's march for reduced keystrokes, and Exercise your computer with Super, ready-to-load programs.

Get **CLOAD MAGAZINE** and get excited too!

The Fine Print:
Overseas rates slightly higher—please write for them.
Back issues available—ask for our list.*
TRS-80 is a trademark of Tandy Corporation
California residents add 6% to single copies and anthologies. Programs are for Level II 16K, Model III 16K, and occasionally for disks.*24 Level I back issues also available.

PRICES

1 year subscription	$42.00
6 month subscription	$23.00
Single copies	$4.50
Anthology-volume 1	$10.00
Anthology-volume 2	$15.00

Mastercard/Visa Welcome.

CLOAD ✓32 MAGAZINE INC. P.O. Box 1267 Goleta, CA 93116 (805) 964-2761 ©1981

TC-8

The TC-8 has been dubbed the "poor man's floppy," and the name fits. The unit saves and loads programs almost five times as fast as conventional cassette, offers a significant improvement in raw data storage, and improves reliability.

The TC-8 connects to the keyboard with a 40-conductor ribbon cable, connects to a 9V AC power adapter, and to the recorder. The operating system (called Util) is loaded from TRS-80 COS tape so the recorder is initially connected to the keyboard. Memory size must be set to 31400 on power up, and the operating system (which occupies about 1.3K) must be loaded at the conventional speed. You can then plug the recorder into the TC-8 and proceed (save & load) at 2400 baud. The results are what one would expect at this speed: A 4.3K program loads in 15 seconds, and a 14K program in 48 seconds.

The TC-8 uses a modified Manchester pulse code (phase encoded) and claims less than one error per million bits. The unit works well with Radio Shack recorders but I found that it would not work with *all* recorders.

The TC-8 has a very smooth operating system and excellent documentation. You can use up to eight characters for program names, and 11 commands are provided, most for saving, loading, and verifying BASIC and machine language programs. There is also a directory command which displays the names of programs as they are encountered on a tape. The KILL command gets rid of Util so that a large program that has been loaded can be run.

The syntax for saving raw data on the TC-8 is: PRINT #1,X. The only difference from standard cassette syntax is that TRS-80 COS uses # – 1. Using that statement in a loop, it took 428 seconds to store 100 three-digit random numbers with the TRS-80 COS. The TC-8 performed the task in 22 seconds, almost 20 times faster! Although the speed of TRS-80 COS data storage can be improved by placing several variables in the same PRINT # – 1 statement, this is not always convenient or even possible in a given program.

The TC-8 software includes a monitor called Tiny. The monitor provides a means to find the beginning, end, and execution addresses of most machine language programs. Tiny also permits you to examine memory locations, relocate Util (for 32K or 48K systems), write backup copies of Util, and jump to any hex address.

The TC-8 can be purchased in kit form. The instructions for the kit are superb and the 11 resistors, nine capacitors, three diodes, two transistors, five ICs, one regulator, plus miscellaneous hardware, can be assembled in about one hour. Assuming all parts are good, you can be up and running for a mere $90.

The FCI-80 and TC-8 are certainly worth considering if you want to improve your cassette storage without investing a major amount. ■

"SPEAK-EAZY"
- the -
HUMAN QUALITY
-VOICE SYNTHESIZER-
$299.00
for the TRS 80*
16K Level II
=Tape or Disk=
- complete with -
: 250+ WORDS in ROM
: EXPANDABLE
: SOFTWARE
: USERS MANUAL
: POWER SUPPLY
: AUDIO AMP
: INTERFACE CABLE
*TRS 80 is a TM of Tandy Corp. ✓277
by PROGRESSIVE ELECTRONICS
643 E. Chestnut St.
Lancaster, OH. 43130
Ph: 614-687-1019

String Packer
FOR THE TRS 80
MODEL I OR III
- Draw a picture; graphics, ASCH II Characters or Mixed, with String Packer's Screen Drawing Routine.
- Issue the 'Pack' command and the screen is packed into a string, ready to merge with your programs.
- String Packer also packs machine language subroutines — no hassle.
- String Packer can edit the packed strings that it creates.

500 Band Cassette — $ 9.95
Single Density Disk — $12.95
New Ideas in Software Service from
The Maine Software Library ✓268
P.O. Box 197
Standish, ME 04084

THE LEAST EXPENSIVE PROGRAMS YOU CAN BUY.
Up to 77 high-quality programs for TRS-80, only $10.95

NewBasic —expands '80 Basic
NewBasic, from Modular Software Associates, adds tremendous power and flexibility to Level II or disk Basic. The disk version includes a unique CREATOR program which allows you to customize NewBasic to inlude any or all of over 30 new commands. Level II NewBasic includes all of the non-disk commands found in disk NewBasic. A few of the many new features added include:
SPOOLING-DESPOOLING (disk version)—Allows printer output to be "spooled" to disk instead of being printed. Later, the file may be "despooled" (i.e. printed out) while the computer can still run Basic, as usual (another program, or you input a program!).
NEW TRACE UTILITY—Now trace more than just a line number! This trace facility displays (LISTs) the line being executed, as well as the current value of specified variables and expressions.
SOUND AND GRAPHICS—Easily create music or sound effects with the versatile SOUND command. Lines and rectangles may be effortlessly drawn with the new graphics commands: LINE, RECT, and FILL.
RS232—NewBasic allows you to initialize your RS-232-C, receive input from it, or output to it—all from within Basic!
QUICK KEY ENTRY—Over 35 pre-defined keys allow you to "type" most any common Basic keyword quickly and without errors.
Blinking cursor; Repeating keys; Lowercase driver; DO-UNTIL; Line labels; RESTORE any DATA line...
and MUCH more, including many features not available elsewhere. The finest enhanced Basic package available for your Model I!
Disk version (1 drive, 32K min.) distributed on cassette ($31.75 CA) $29.95
Level II (cassette) version (16K min) $19.95 (may be upgraded to disk for $10.95) $19.95

SuperPIMx—People's Database
PIMS has been greatly speeded up and simplified, with machine-language sorts, key debounce, optional automatic lowercase (no keying, no hardware mod) on labels or reports. Up to 20 fields, limited by 255-character maximum per field. Easy to revise, add records, split or merge files, sum or average any fields. Customized for tape, tape & disk, Zoom, TC8 Poor Man's Floppy, B17, Stringy Floppy—all on one tape! As mailing labels program, easily manages 20,000 list. CIE does! Advanced labels module to come, $24.95, making system most powerful mailer available!
program (CIE) $19.95 ($21.15 CA)
book, details uses (CIE) $11.95 ($12.67 CA)

NewDOS-80—New Low Price!
Successor to NewDOS+, same package for which you pay $149 elsewhere, at CIE just...
($105.95 CA) $99.95

Games for color TRS-80
Modular Software Assoc. tape contains:
• PONG-80 • ENTRAP • DEMOLISH (like Breakout) • TRAFFIC (Grand Prix auto race) • BETA TREK space game • SHUTTLE (rocket ship game). $19.95 ($20.55 CA)

PASPATCH
PasPatch, Tape 6P, makes Tandy tiny Pascal a powerful disk system!
Modular Software Assoc. $15.95

All orders charge card, check or m.o.
Calif. residents add 6 pct tax. Dealer inq. invited
Overseas, add $1.50 per tape postage
COMPUTER INFORMATION EXCHANGE
Box 159
San Luis Rey CA 92068 ✓22

✓See List of Advertisers on page 306

A program-packing utility for those with short memories.

Comprs

Stephen Barker
7700 Parkway Dr. #44
La Mesa, CA 92041

Comprs is a machine language utility program which will remove REM statements and extra spaces from BASIC programs. This allows you to fully document your file copy of a program and then compress it into a smaller work copy. Spaces within quotes will not be removed. Warning: This program not only removes the REM statement but the entire line. Therefore, any references to that line must be changed.

I have included two versions of this program. The first is a source listing for the machine language version. This can be assembled using the Radio Shack Editor/Assembler. The second version is a BASIC listing in which the machine language version has been broken into data statements. This program will POKE the machine language version into memory. If you choose to use the BASIC version, write a small loop to add up the sum of all the data statements. The total should be 23,416. Use this to cross-check the numbers you entered.

Instructions

Machine Language: Enter the BASIC program to be compressed by CLOADing. Enter Comprs using the SYSTEM command. Execute the program by typing / and Enter. When READY is shown on the screen, the program has been compressed.

BASIC: Enter and run the BASIC version of Comprs. CLOAD the program to be compressed. Type SYSTEM and Enter. When ? appears on the screen type /32512 and Enter. When READY is shown on the screen, the program has been compressed. ■

Program Listing 2

```
100 'THIS IS A BASIC VERSION OF COMPRESS. THIS WILL POK
     E
110 'THE MACHINE LANGUAGE PROGRAM INTO MEMORY.
120 FORX=32512TO32715:READA:POKEX,A:NEXT:END
130 DATA33,233,66,34,254,126,33,253,126,54,0,42,254,126
     ,35
140 DATA35,35,35,126,254,147,40,14,254,34,40,73,254,32,
     40,90
150 DATA254,0,40,41,24,236,42,254,126,35,35,35,35,1,4,0
     ,35
160 DATA3,126,254,0,32,249,3,35,229,42,249,64,237,91,25
     4,126
170 DATA175,237,82,229,193,225,237,176,42,254,126,43,35
     ,229
180 DATA126,254,0,32,6,35,126,254,0,40,60,225,34,254,12
     6,33
190 DATA253,126,54,0,24,167,58,253,126,254,0,40,7,62,0,
     50,253
200 DATA126,24,159,62,1,50,253,126,24,152,58,253,126,25
     4,1
210 DATA40,145,229,229,229,42,249,64,209,175,237,82,229
     ,193
220 DATA225,35,237,176,225,43,195,17,127,33,233,66,34,2
     54,126
230 DATA42,254,126,126,254,0,32,13,35,126,254,0,32,7,35
     ,34
240 DATA249,64,195,25,26,42,254,126,35,35,35,35,126,254
     ,0,32
250 DATA250,35,229,229,193,42,254,126,113,35,112,225,34
     ,254
260 DATA126,24,207
```

Program Listing 1

```
                00100          ;COMPRS IS A PROGRAM TO REMOVE REM STATEMENTS AND
                00110          ;SPACES FROM BASIC PROGRAMS
7F00            00120          ORG     7F00H
7F00            00130 START    EQU     $
7EFE            00140 REF      EQU     START-2          ;REFERENCE POINTER
7EFD            00150 QTE      EQU     START-3          ;QUOTE FLAG
7F00 21E942     00160          LD      HL,42E9H         ;BEGINNING OF BASIC
7F03 22FE7E     00170          LD      (REF),HL         ;SET POINTER
7F06 21FD7E     00180          LD      HL,QTE           ;RESET FLAG
7F09 3600       00190          LD      (HL),0
7F0B 2AFE7E     00200 SEARCH   LD      HL,(REF)         ;SEARCH FOR KEY CODES
7F0E 23         00210          INC     HL               ;SKIP 4 BYTES
7F0F 23         00220          INC     HL
7F10 23         00230          INC     HL
7F11 23         00240 NXT      INC     HL
7F12 7E         00250          LD      A,(HL)
7F13 FE93       00260          CP      93H              ;REM?
7F15 280E       00270          JR      Z,REM
7F17 FE22       00280          CP      22H              ;QUOTES?
7F19 2849       00290          JR      Z,QUOTE
7F1B FE20       00300          CP      20H              ;SPACE?
7F1D 285A       00310          JR      Z,SPACE
7F1F FE00       00320          CP      0                ;END OF LINE?
```

Program Continues

```
7F21 2829      00330          JR      Z,ENTER
7F23 18EC      00340          JR      NXT
7F25 2AFE7E    00350 REM      LD      HL,(REF)        ;THIS DELETES REM LINE
7F28 23        00360          INC     HL              ;SKIP 4 BYTES
7F29 23        00370          INC     HL
7F2A 23        00380          INC     HL
7F2B 23        00390          INC     HL
7F2C 010400    00400          LD      BC,4            ;BYTE COUNTER
7F2F 23        00410 R1       INC     HL
7F30 03        00420          INC     BC
7F31 7E        00430          LD      A,(HL)
7F32 FE00      00440          CP      0               ;END OF LINE?
7F34 20F9      00450          JR      NZ,R1
7F36 03        00460          INC     BC              ;ADD BYTE TO COUNTER
7F37 23        00470          INC     HL
7F38 E5        00480          PUSH    HL
7F39 2AF940    00490          LD      HL,(40F9H)      ;END OF PROGRAM
7F3C ED5BFE7E  00500          LD      DE,(REF)        ;POINTER
7F40 AF        00510          XOR     A
7F41 ED52      00520          SBC     HL,DE           ;# OF BYTES TO BE MOVED
7F43 E5        00530          PUSH    HL
7F44 C1        00540          POP     BC              ;# 0F BYTES DELETED
7F45 E1        00550          POP     HL
7F46 EDB0      00560          LDIR                    ;DELETE LINE
7F48 2AFE7E    00570          LD      HL,(REF)
7F4B 2B        00580          DEC     HL
7F4C 23        00590 ENTER    INC     HL              ;LAST LINE?
7F4D E5        00600          PUSH    HL
7F4E 7E        00610          LD      A,(HL)
7F4F FE00      00620          CP      0
7F51 2006      00630          JR      NZ,E1           ;CANNOT BE LAST LINE
7F53 23        00640          INC     HL
7F54 7E        00650          LD      A,(HL)
7F55 FE00      00660          CP      0
7F57 283C      00670          JR      Z,POINT         ;END OF PROGRAM
7F59 E1        00680 E1       POP     HL
7F5A 22FE7E    00690          LD      (REF),HL
7F5D 21FD7E    00700          LD      HL,QTE
7F60 3600      00710          LD      (HL),0          ;CLEAR QUOTE FLAG
7F62 18A7      00720          JR      SEARCH
7F64 3AFD7E    00730 QUOTE    LD      A,(QTE)         ;THIS CHECKS TO SEE IF
7F67 FE00      00740          CP      0               ;QUOTE FLAG IS SET
7F69 2807      00750          JR      Z,Q1
7F6B 3E00      00760          LD      A,0             ;RESET FLAG
7F6D 32FD7E    00770          LD      (QTE),A
7F70 189F      00780          JR      NXT
7F72 3E01      00790 Q1       LD      A,1             ;SET FLAG
7F74 32FD7E    00800          LD      (QTE),A
7F77 1898      00810          JR      NXT
7F79 3AFD7E    00820 SPACE    LD      A,(QTE)         ;THIS REMOVES SPACE IF
7F7C FE01      00830          CP      1               ;NOT WITHIN QUOTES
7F7E 2891      00840          JR      Z,NXT           ;QUOTES ARE SET
7F80 E5        00850          PUSH    HL
7F81 E5        00860          PUSH    HL
7F82 E5        00870          PUSH    HL
7F83 2AF940    00880          LD      HL,(40F9H)      ;END OF PROGRAM
7F86 D1        00890          POP     DE
7F87 AF        00900          XOR     A
7F88 ED52      00910          SBC     HL,DE           ;# OF BYTES TO BE MOVED
7F8A E5        00920          PUSH    HL
7F8B C1        00930          POP     BC
7F8C E1        00940          POP     HL
7F8D 23        00950          INC     HL
7F8E EDB0      00960          LDIR                    ;REMOVE SPACE
7F90 E1        00970          POP     HL
7F91 2B        00980          DEC     HL
7F92 C3117F    00990          JP      NXT
7F95 21E942    01000 POINT    LD      HL,42E9H        ;THIS RESETS ALL LINE
7F98 22FE7E    01010          LD      (REF),HL        ;POINTERS
7F9B 2AFE7E    01020 P1       LD      HL,(REF)
7F9E 7E        01030          LD      A,(HL)
7F9F FE00      01040          CP      0               ;LAST LINE?
7FA1 200D      01050          JR      NZ,P2
7FA3 23        01060          INC     HL
7FA4 7E        01070          LD      A,(HL)
7FA5 FE00      01080          CP      0
7FA7 2007      01090          JR      NZ,P2
7FA9 23        01100          INC     HL
7FAA 22F940    01110          LD      (40F9H),HL      ;SET END OF PROGRAM
7FAD C3191A    01120          JP      1A19H           ;RETURN TO BASIC
7FB0 2AFE7E    01130 P2       LD      HL,(REF)
7FB3 23        01140          INC     HL              ;SKIP 4 BYTES
7FB4 23        01150          INC     HL
7FB5 23        01160          INC     HL
7FB6 23        01170 P3       INC     HL
7FB7 7E        01180          LD      A,(HL)
7FB8 FE00      01190          CP      0               ;END OF LINE?
7FBA 20FA      01200          JR      NZ,P3
7FBC 23        01210          INC     HL
7FBD E5        01220          PUSH    HL
7FBE E5        01230          PUSH    HL
7FBF C1        01240          POP     BC
7FC0 2AFE7E    01250          LD      HL,(REF)
7FC3 71        01260          LD      (HL),C          ;SET POINTER LSB
7FC4 23        01270          INC     HL
7FC5 70        01280          LD      (HL),B          ;SET POINTER MSB
7FC6 E1        01290          POP     HL
7FC7 22FE7E    01300          LD      (REF),HL        ;SET REFERENCE
7FCA 18CF      01310          JR      P1
7F00           01320          END     START
00000 TOTAL ERRORS
```


PMC80 16K Level II
Compatible with all TRS80* hardware and software plus it has an S100 bus
$499

Expansion interface (for PMC80) with disk controller, RS232, parallel, 2 empty slots
$299
Expand to 48K for $219

Call us for Model III

EPSON MX 80 PRINTER
$469
Aerocomp disk drives
120 day warranty
Best Buy - 80 track flippy
$429 complete
Flip diskette and use both sides!
Diskettes $2.25

Color
Sound
Synthesizer
High Resolution
Graphics
Fully Expandable
9K RAM 14K ROM
LOW PRICE
APF Imagination Machine
$475

With expansion box, disk controller and 5¼ drive.....$849
SI 232 Serial interface cartridge. Connect a printer or modem!
$135

A lot of companies offer "unbeatable" prices — TGS is serious about giving you the lowest prices possible on only the best quality products. We will meet or beat anyone's price. Buying from companies that advertise high prices and a meet or beat policy is self-defeating — TGS will go out of business and you'll be back paying those high advertised prices! We can get almost ANY computer or related product for you at the lowest possible cost. All prices cash discounted.

M/C, Visa, COD add 5%. Shipping freight collect, 5%, or $5 per item, your choice.

THE GRAPHIC SOURCE
Route 2, Box 44 ✓73
Canton, Kansas 67428
(316) 628-4935

*Trademark of Tandy/Radio Shack

✓See List of Advertisers on page 306

This time-saving gambit allows you to save, then reload, ongoing Sargon struggles.

The Sargon Saver

Thomas L. Quindry
TLQ Enterprises
6237 Windward Dr.
Burke, VA 22015

Ever wish you could play Sargon at its highest level of play without tieing up your computer for weeks at a time? Sargon I takes up to 16 hours to analyze a move at its top level of play. Sargon II, though faster, takes between four and seven hours at its top level.

While this game is in progress your computer is not available for any other use. You could power up Sargon every day and set up the current board position, but that doesn't sound too promising. After all, it's a tough job to manually set up the game position, let alone remembering it from day to day.

Computer Set-up

It doesn't have to be a time-consuming job. You bought your computer to free you from slavery. All you have to do is tell your computer how to set up the board position.

The following are programs that modify the cassette-loading versions of Sargon I and II. Once modified, Sargon will save the current board position to tape, along with the move number, or load a saved tape with the above information to restore the game.

Program Listing 1 is the Sargon I patch program, which I call MODIA. The Sargon II patch program called MODIIA is Program Listing 2. When your Sargon program is modified by the appropriate patch, it will generate a data tape which can be later loaded into either Sargon I or II. If you currently have Sargon I and plan to get Sargon II, you can save important Sargon I game positions for later strategy planning with Sargon II and vice versa.

Loading the patch programs is simple. For Sargon I, load the game program, and when you receive the prompt, load MODIA. At the second prompt, enter / or /28922. Loading the patch for Sargon II is a bit more complicated. Sargon II normally loads in two parts; with the patch, it must be loaded in three. Load the short loader program as you normally would. Then, remove the game tape from your cassette recorder and load MODIIA. After MODIIA is loaded, replace the Sargon II tape without rewinding, hit / and enter and the final part of Sargon II will load.

The patch programs interrupt Sargon in subtle ways (which have no effect on its chess playing abilities) to provide I/O capabilities via cassette tape. Messages have been added to prompt you: With Sargon I, answer the questions with a yes or no. With Sargon II, hit S to save the current board position, L to load a previous board position, and G to start a new game or C to change the board.

The MODIIA patch starts at address 44A0H (line 150). This address interrupts the Sargon II loader program just before its jump into the main part of the chess program, enabling our modifications to be made before we lose command control of the program.

Lines 160 to 190 make changes to the title. Lines 200 to 250 add prompting messages to allow you to save or load the board position and move number. Since the move number is used in the decision making process of Sargon II, it is important to have it.

Lines 260 to 320 provide the patches to the main program and then return control to Sargon II. The proper messages are displayed via the patch address to start in lines 330 to 390. Control is then returned to Sargon II in line 400. Conditional statements for the load and save routines are accessed by the patch to COND in line 410. If no key is entered or any letter other than an S or L is entered, the program returns to Sargon II in line 440. Otherwise, the program jumps to the load (lines 450 to 570) or save (lines 580 to 700) routines and then back to Sargon II at the proper locations. The ready subroutine gives the READY CASSETTE message and sets registers for the load and save routines.

When playing Sargon I or II, you may save a board position and then continue playing where you left off by giving the command to analyze a position or change board. After loading a game position, you are prompted to tell what color you are playing and, in Sargon II, the move number. Since the move number has been loaded into memory, you must hit enter twice to preserve it.

The MODIA format is different, since I tried to preserve the general format of operation used in each game program. In lines 160 to 200 of Listing 1 is a patch to correct the need for

White			Black	
Original Position	After Moving	Piece	Original Position	After Moving
01	09	Pawn	81	89
02	0A	Knight	82	8A
03	0B	Bishop	83	8B
04	0C	Rook	84	8C
05	0D	Queen	85	8D
06	0E	King	86	8E
00		Empty Square		

Table 1. Game position notation for Sargon I and II (Given in hexidecimal notation)

GET ORGANIZED

With These Utility Programs From Instant Software

FIND IT QUICK

Put an end to the Misplaced Information Syndrome! Here is a reliable, fast, subject-oriented information locator—FIND IT QUICK! This information indexing and retrieval system is versatile and flexible—the ideal tool for doctors, lawyers, engineers, businessmen, educators, anyone who needs to locate information.

Designed with a journal/magazine format, FIQ is versatile enough to be used to store and retrieve any type of reference information including client lists, vendor advertisements, report bibliographies and more—even poems and famous quotations. Subjects can be indexed or called according to author, journal and date or by up to nine keywords that you determine. Keywords can be used singly or in combination during the search routines.

FIQ can be used by anyone. It requires no special skill, just the ability to type. Article references to be stored can be preselected and then entered into the system by a secretary or assistant. The contents of entire file cabinets can even be indexed and stored!

FIND IT QUICK requires a minimum system consisting of a TRS-80 Model I Level II with 16K of RAM, an Expansion Interface with 16K of RAM and at least one disk drive. Up to 1080 items can be stored on one data disk. Instant Software's Tiny DOS operating system is included on the program disk so that you can use the program without fuss or bother.

Make your computer work like your own personal librarian with FIND IT QUICK. Can you afford to wait another day?

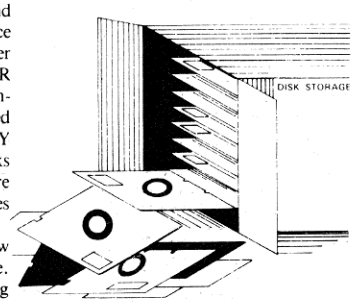
Order No. 0258RD $49.95. Disk

MASTER DIRECTORY

The MASTER DIRECTORY is a disk file storage program that reads the files on all your disks and stores the file names and extensions and even records the free space on each disk. All you have to do is number the disks in your library and the MASTER DIRECTORY will keep track of their contents. You can read the names, displayed alphabetically, search the DIRECTORY for file names and extensions, delete disks and search for free space. You can store 5000 files or 320 disks, whichever comes first.

Your disk storage problems are over now that the MASTER DIRECTORY is here. This package requires the following minimum system:

1. A TRS-80 Level II with 16K RAM.
2. An Expansion Interface.
3. One (or more) disk drives.



Order No. 5005RD (disk-based version) $29.95

TO ORDER:

SEE YOUR LOCAL INSTANT SOFTWARE DEALER OR CALL TOLL-FREE

1-800-258-5473

Instant Software™

PETERBOROUGH, N.H. 03458

TEXAS COMPUTER SYSTEMS

Radio Shack

Authorized Sales Center

We offer the lowest prices on

TRS-80®

COMPUTERS

MODEL II 64K $3349

An excellent computer for your business needs. Easy expandability & compatibility. No formal operator training needed. All accessories available—disk expansions, printers and software. Quick delivery-airfreight from Dallas.

Model III 16K LIII $849
Color Computer 4K LI $339
Model III 32K 2 Disks - $Call
Pocket Computer & Acc. $Call

PRINTERS

DAISY WHEEL II $1695

Carbon ribbon typewriter quality for word processing. 43 cps. Standard Centronics parallel interface. Full 16" width, individual sheets or friction feed. Tractor feed $250 extra. Fastest Daisy Wheel available at this price.

EPSON MX-80 $Call

Letter quality matrix similar to Line Printer IV and Centronics Printer but has full software control of 40, 80, 66 or 132 columns. 80cps bidirectional, tractor feed, disposable printhead. $300 less than nearest competitive printer. Best buy in multi-strike letter quality printer. Lists at $645. Our price includes cable & shipping.

ANADEX 9500/9501 $1385

200cps 7x9 or 9x9 matrix, dot addressable graphics, excellent quality & price. 10, 12, 13.3, 16.7 cpi; 6 or 8 1pi, standard parallel, serial, and current loop interfaces included.

LINE PRINTER V $1616

160cps. Designed for heavy business use. Bidirectional, 7x9 matrix.

LINE PRINTER VI $1015

Fast, versatile, takes single sheets & pin fed forms, 100 cps bidirectional, low profile. List $1160.

CUSTOM SOFTWARE FROM TCS

Model I & III Programs for the Epson MX-80 Printer

You get 6 programs for one low price. A library on disk or tape of programs and subroutines designed for gaining maximum use of the Epson MX-80 printer.

BIGLETT/BAS—Produce large graphic letters and dump them to the printer/screen/disk. Works from any Basic program.
EPSON/SUB—Subroutine to easily use all of the EPSON printer commands. Merge into any Basic program.
DEFSTATE/SUB—Collection of pre-defined commands accessible from any Basic program. Auto line centering, titles with borders, etc., instantly with one word commands.
DEMO/BAS—Tutorial program with 100's of REM remarks to guide you thru the use of your computer.
JKL PATCH—A patch to NEWDOS 2.1/80's JKL screen printer function to print graphics from screen in the Regular Epson printer mode.
ARTICLE—Complete article on many printer possibilities plus new ideas, concepts, & trouble shooting tips.

Model I or III, Tape or Disk
$39.95 for all 6 programs
$29.95 if purchased with Epson printer

The DOS Disk Library of Programs

A library of 5 programs for NEWDOS80, NEWDOS 2.1, TRSDOS (Model I & III).

DIRMAINT—A super directory-maintenance program. Purge, copy, rename, re-format, etc., quickly with minimum typing. Super graphic displays for easy use.
FILEMAINT—Creates master directory of all files on your library of diskettes. Master file is handled on disk, not on memory, for maximum speed. Access any file in 2 seconds. 48K supports 200 diskettes. 32K about 100. Takes less than hour to run 100 diskettes thru system.
CHAINBLD/BAS—A super chaining file creation editor & assembler for NEWDOS80. Very fast, easy to use. Reads and edits existing files.
HOMEMAIL—Unique home mailing list that stores data by modifying program itself. Fast & efficient for home user with less than 100 names.
GASMILE—Maintains excellent records of auto gas use & complete reports on MPG, etc. Also provides car maintenance alerts.

Model I or III Disk **$39.95** for all 5 programs

Infinite Basic Diskette

A diskette of programs written in RACET's Infinite Basic. User must have Infinite Basic (both modules). Extremely useful program with REM remarks to guide you in easy use of the 100 extra commands provided by this software system.

Included on the disk is program to maintain a Video Cassette Library, an in-memory Mailing List, a demonstration of Matrix Techniques and equation solution, a screen input system routine. Also a complete article on Infinite Basic with valuable information on commands that are glossed over in the original documentation.

Model I or III Disk only **$39.95**

We can Air Freight from Dallas to major a/p near you for fast, efficient service. Call for information.

*Payment: Money Order, Cashier's Check, Certified Check. Personal Checks require 3 wks. to clear. VISA, MC, add 3%.
*Prices subject to change any time.
*No tax out-of-state. TX add 5%.
*All items new, guaranteed by manufacturer.
*Delivery subject to availability.
*Shipping extra, quoted by phone.

TEXAS COMPUTER SYSTEMS ✓25

An Authorized **RADIO SHACK®** Sales Center F701

Box 1174, Brady, Texas 76825

TOLL FREE Number 800-351-1473

Texas Residents 915-597-0673

✓See List of Advertisers on page 306

double entry of the letter Y or N when asked by Sargon I whether you care to play a game. (The Sargon I manual accuses Radio Shack of having an error in ROM, but it appears to be a Sargon error. Sargon I asks for two inputs. The first input is ignored.)

Sargon I does not store the move number in ASCII format as does Sargon II; appropriate conversions are made in the load and save routines for compatibility of data tapes.

In Sargon II the buffer area for the game position starts at 5115H (20757 decimal). The Sargon I buffer starts at 50C9H (20681 decimal). Each is formatted the same. Table 1 gives the code for each game piece and blank squares. The board position bytes are taken directly from the Sargon program. The first eight bytes on the data tape represent the first row of the chess board on the white side. Two more bytes, each containing FFH, follow and then the second row of the chess board follows that. Then come two more bytes of FFH, etc. Thus, it takes 78 consecutive bytes to represent the chess board.

The bytes containing FFH which occur between every row of eight board bytes mean nothing to us at this time but it is easier to record them on tape than to skip them. After these 78 bytes is the byte representing the move number in ASCII format.

One other useful location in Sargon II will be of interest to assembly language programmers. Sargon II has a keyboard scan routine starting at 767AH (30330 decimal). By patching into this location things can be added such as a tone (using the cassette output to an amplifier) to let you know when an input is expected from you; or such as adding a printing routine to print moves displayed on the left side of the screen or a graphic picture of the current board set-up. The print routines could use transparent codes, i.e., commands such as SHIFT P which will not show up on the screen but will signal the computer to branch to the correct routine. ■

Program Listing 1. MODIA patch for Sargon I.

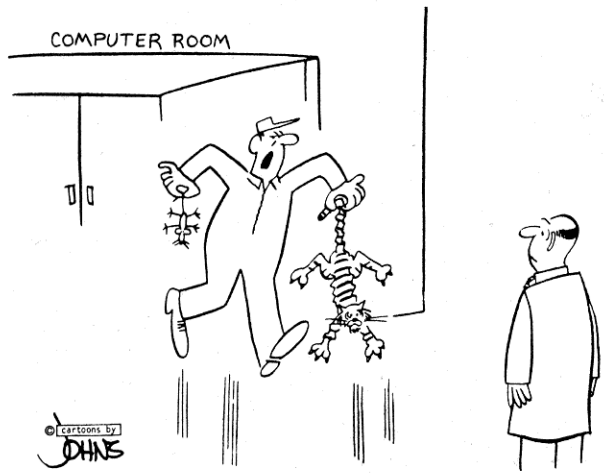
```
                00100 ;MODIA
                00110 ;SARGON I MODIFICATION
                00120 ;SAVE OR LOAD PIECE POSITION OF
                00130 ;PREVIOUS GAME TO CASSETTE TAPE
                00140 ;DATA TAPE GENERATED IS COMPATABLE
                00150 ;FOR USE WITH SARGON II WITH MODIIA
69F0            00160          ORG     69F0H          ;DOUBLE ENTR
Y CORRECTION
69F0 0000       00170          DEFW    00
69F2 0000       00180          DEFW    00
69F4 0000       00190          DEFW    00
69F6 00         00200          DEFB    00
6DDC            00210          ORG     6DDCH
6DDC 004E       00220          DEFW    LDDATA         ;PATCH MODIA
 ADDRESS IN SARGON I
4E00            00230          ORG     4E00H
4E00 21914E     00240 LDDATA   LD      HL,MESS1       ;ADD "LOAD"
MESSAGE
4E03 062A       00250          LD      B,42           ;MESSAGE LEN
GTH
4E05 CD4B69     00260          CALL    694BH          ;SARGON PRIN
T AND KEYBOARD ENTRY ROUTINES
4E08 CD566D     00270          CALL    6D56H
4E0B CD4569     00280          CALL    6945H
4E0E FE59       00290          CP      89
4E10 2802       00300          JR      Z,LOAD         ;IF "L" LOAD
 GAME POSITION FROM CASSETTE
4E12 1830       00310          JR      SVDATA         ;JUMP TO SAV
E DATA? ROUTINE
4E14 CDF84E     00320 LOAD     CALL    READY          ;LOAD ROUTIN
E
4E17 CD1202     00330          CALL    0212H
4E1A CD9602     00340          CALL    0296H
4E1D CD3502     00350 LOOP1    CALL    0235H
4E20 77         00360          LD      (HL),A
4E21 23         00370          INC     HL
4E22 1D         00380          DEC     E
4E23 7B         00390          LD      A,E
4E24 20F7       00400          JR      NZ,LOOP1
4E26 CD3502     00410          CALL    0235H          ;GETS MOVE N
UMBER IN ASCII FORMAT
4E29 0630       00420          LD      B,48
4E2B FE0A       00430 ASC      CP      10             ;CHANGE MOVE
 NUMBER FROM ASCII
4E2D DA354E     00440          JP      C,ENT
4E30 04         00450          INC     B
4E31 D60A       00460          SUB     10
4E33 18F6       00470          JR      ASC
4E35 C630       00480 ENT      ADD     A,48
4E37 327D68     00490          LD      (687DH),A      ;BUFFER FOR
ONE'S DIGIT OF MOVE NUMBER
4E3A 78         00500          LD      A,B
4E3B 327C68     00510          LD      (687CH),A      ;BUFFER FOR
TEN'S DIGIT OF MOVE NUMBER
4E3E CDF801     00520          CALL    01F8H
4E41 C3656E     00530          JP      6E65H          ;JUMP BACK T
O SARGON AFTER LOAD
4E44 21BB4E     00540 SVDATA   LD      HL,MESS2       ;ADD "SAVE"
MESSAGE
4E47 061F       00550          LD      B,31
4E49 CD4B69     00560          CALL    694BH
4E4C CD566D     00570          CALL    6D56H
4E4F CD4569     00580          CALL    6945H
4E52 FE59       00590          CP      89
4E54 2803       00600          JR      Z,SAVE         ;IF "S" SAVE
 GAME TO CASSETTE
4E56 C3CC06     00610          JP      06CCH          ;JUMP TO BAS
IC IF NO OPTION SELECTED
4E59 CDF84E     00620 SAVE     CALL    READY          ;SAVE ROUTIN
E
4E5C CD1202     00630          CALL    0212H
4E5F CD8702     00640          CALL    0287H
4E62 7E         00650 LOOP2    LD      A,(HL)
4E63 CD6402     00660          CALL    0264H
4E66 23         00670          INC     HL
4E67 1D         00680          DEC     E
4E68 7B         00690          LD      A,E
4E69 20F7       00700          JR      NZ,LOOP2
4E6B 3A7C68     00710          LD      A,(687CH)      ;GET TEN'S D
IGIT OF MOVE NUMBER
4E6E D630       00720          SUB     48             ;ASCII FORMA
T ROUTINE
4E70 0600       00730          LD      B,0
4E72 2809       00740 ZERO     JR      Z,NOINCR
4E74 F5         00750          PUSH    AF
4E75 78         00760          LD      A,B
4E76 C60A       00770          ADD     A,10
4E78 47         00780          LD      B,A
4E79 F1         00790          POP     AF
4E7A 3D         00800          DEC     A
4E7B 18F5       00810          JR      ZERO
4E7D 3A7D68     00820 NOINCR   LD      A,(687DH)      ;GET ONE'S D
IGIT
4E80 D630       00830          SUB     48
4E82 80         00840          ADD     A,B            ;MOVE NUMBER
 NOW IN ASCII FORMAT
4E83 CD6402     00850          CALL    0264H          ;SAVE MOVE N
UMBER IN ASCII
4E86 3EFF       00854          LD      A,0FFH
4E88 CD6402     00858          CALL    0264H
4E8B CDF801     00860          CALL    01F8H
4E8E C3FA70     00870          JP      28922          ;JUMP TO SAR
GON START LOCATION
4E91 4C         00880 MESS1    DEFM    'LOAD PREVIOUS GAME POSITION
 FROM CASSETTE?'
4EBB 53         00890 MESS2    DEFM    'SAVE GAME POSITION TO CASSE
TTE?'
4EDA 52         00900 MESS3    DEFM    'READY CASSETTE AND PRESS EN
TER'
4EF8 21DA4E     00910 READY    LD      HL,MESS3       ;READY CASSE
TTE MESSAGE
4EFB 061F       00920          LD      B,31
4EFD CD4B69     00930          CALL    694BH
4F00 CD566D     00940          CALL    6D56H
4F03 CD4569     00950          CALL    6945H
4F06 CDC901     00960          CALL    01C9H          ;CLEAR SCREE
N
4F09 3E00       00970          LD      A,0
4F0B 21C950     00980          LD      HL,50C9H       ;SARGON STAR
T OF BOARD POSITION BUFFER
4F0E 1E4E       00990          LD      E,78           ;LENGTH OF S
ARGON BUFFER
4F10 C9         01000          RET
70FA            01010          END     28922          ;START ADDRE
SS OF SARGON
00000 TOTAL ERRORS
```

Program Listing 2. MODIIA patch for Sargon II.

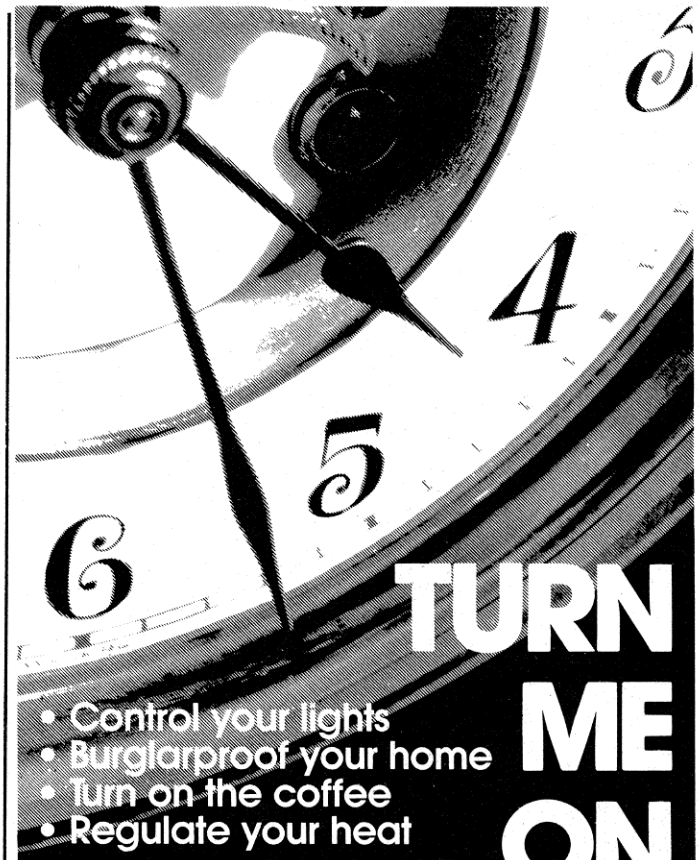
```
                00100 ;MOD IIA
                00110 ;SARGON II MODIFICATION
                00120 ;SAVE OR LOAD BOARD POSITION OF
                00130 ;PREVIOUS GAME TO CASSETTE TAPE
                00140
44A0            00150          ORG     44A0H          ;PATCH INTO
SARGON LOAD TAPE
44A0 21AF45     00160          LD      HL,TITLE       ;BLOCK MOVE
TO CHANGE SARGON TITLE
44A3 11CF6E     00170          LD      DE,6ECFH
44A6 011200     00180          LD      BC,12H
44A9 EDB0       00190          LDIR                   ;BLOCK MOVE
44AB 21C145     00200          LD      HL,MESS        ;BLOCK MOVE
TO CHANGE ENDING OF SARGON "NEW GAME - -" MESSAGE
44AE 110D6F     00210          LD      DE,6F0DH
44B1 010600     00220          LD      BC,6
44B4 EDB0       00230          LDIR                   ;BLOCK MOVE
44B6 3E24       00240          LD      A,24H          ;CHANGE LENG
TH OF MESSAGE
44B8 325A70     00250          LD      (705AH),A
44BB 21CF44     00260          LD      HL,START       ;PATCH FOR M
ESS1 AND MESS2 ADDITION
44BE 225770     00270          LD      (7057H),HL
44C1 3EC3       00280          LD      A,0C3H         ;CHANGE TO J
P INSTRUCTION
44C3 325670     00290          LD      (7056H),A
44C6 21E544     00300          LD      HL,COND        ;PATCH TO CO
NDITIONAL STATEMENTS
```

Program continues

```
44C9 226870    00310          LD      (7068H),HL
44CC C30050    00320 SARGON   JP      5000H          ;JUMP TO BEG
INNING OF SARGON PROGRAM
44CF 112D45    00330 START    LD      DE,MESS1       ;ADD OUR MES
SAGES
44D2 062A      00340          LD      B,2AH
44D4 CDD175    00350          CALL    75D1H          ;SARGON PRIN
T ROUTINE
44D7 115745    00360          LD      DE,MESS2
44DA 061F      00370          LD      B,1FH
44DC CDD175    00380          CALL    75D1H
44DF 11EF6E    00390          LD      DE,6EEFH       ;RESTORE SAR
GON INSTRUCTION LOST BY PATCH
44E2 C35970    00400          JP      7059H          ;JUMP BACK T
O SARGON AFTER MESSAGE INSERT
44E5 FE53      00410 COND     CP      83
44E7 2822      00420          JR      Z,SAVE         ;IF "S" SAVE
 GAME POSITION TO CASSETTE
44E9 FE4C      00430          CP      76
44EB 20DF      00440          JR      NZ,SARGON      ;IF "L" LOAD
 GAME POSITION FROM CASSETTE, IF NOT JUMP TO SARGON
44ED CD9645    00450 LOAD     CALL    READY          ;CASSETTE LO
AD ROUTINE
44F0 CD1202    00460          CALL    0212H
44F3 CD9602    00470          CALL    0296H
44F6 CD3502    00480 LOOP1    CALL    0235H
44F9 77        00490          LD      (HL),A
44FA 23        00500          INC     HL
44FB 1D        00510          DEC     E
44FC 7B        00520          LD      A,E
44FD 20F7      00530          JR      NZ,LOOP1
44FF CD3502    00540          CALL    0235H
4502 323550    00550          LD      (20533),A      ;GET NUMBER
OF MOVES PLAYED
4505 CDF801    00560          CALL    01F8H
4508 C37470    00570          JP      7074H          ;JUMP BACK T
O SARGON AFTER LOAD
450B CD9645    00580 SAVE     CALL    READY          ;CASSETTE SA
VE ROUTINE
450E CD1202    00590          CALL    0212H
4511 CD8702    00600          CALL    0287H
4514 7E        00610 LOOP2    LD      A,(HL)
4515 CD6402    00620          CALL    0264H
4518 23        00630          INC     HL
4519 1D        00640          DEC     E
451A 7B        00650          LD      A,E
451B 20F7      00660          JR      NZ,LOOP2
451D 3A3550    00670          LD      A,(20533)      ;SAVE NUMBER
 OF MOVES PLAYED
4520 CD6402    00680          CALL    0264H
4523 3EFF      00684          LD      A,0FFH
4525 CD6402    00688          CALL    0264H
4528 CDF801    00690          CALL    01F8H
452B 189F      00700          JR      SARGON
452D 4C        00710 MESS1    DEFM    'LOAD PREVIOUS GAME POSITION
 FROM CASSETTE,'
4557 53        00720 MESS2    DEFM    'SAVE GAME POSITION TO CASSE
TTE,'
4576 52        00730 MESS3    DEFM    'READY CASSETTE AND PRESS EN
TER:'
4595 88        00740          DEFB    136
4596 117645    00750 READY    LD      DE,MESS3       ;READY CASSE
TTE MESSAGE
4599 0620      00760          LD      B,20H
459B CDD175    00770          CALL    75D1H
459E CD2B00    00780 BACK     CALL    2BH
45A1 B7        00790          OR      A
45A2 28FA      00800          JR      Z,BACK
45A4 CDC901    00810          CALL    01C9H          ;CLEAR SCREE
N
45A7 3E00      00820          LD      A,0
45A9 211551    00830          LD      HL,5115H       ;SARGON STAR
T OF BOARD POSITION BUFFER
45AC 1E4E      00840          LD      E,78           ;LENGTH OF S
ARGON BUFFER
45AE C9        00850          RET
45AF 20        00860 TITLE    DEFM    ' SARGON-IIA ***** '
45C1 2C        00870 MESS     DEFM    ',L,S):'       ;ADD INSTRUC
TIONS FOR LOAD OR SAVE ROUTINES
4415           00880          END     4415H          ;START ADDRE
SS OF SARGON LOAD ROUTINE
00000 TOTAL ERRORS
```



" I FOUND THE TROUBLE WITH NUMBER THREE COMPUTER. "



TURN ME ON

- Control your lights
- Burglarproof your home
- Turn on the coffee
- Regulate your heat

All with your TRS-80

Imagine the function of lamps, alarms, heaters, pumps, radios and appliances under the control of your TRS-80. With the SUPER X10 MOD from CmC, **computer control** of up to 256 low-cost BSR remote-control modules is possible over the AC house lines **with no special wiring**. The SUPER X10 MOD contains its own microprocessor with **clock/calendar functions** so that once **programmed from the TRS-80**, a sequence of events can be initiated at a specific time of day, **even with your computer off**. In addition, the SUPER X10 MOD can control up to eight digital logic functions and respond to a maximum of eight logic inputs such as switches mounted at windows and doors, fluid level floats, thermostats, and so on.

Control of remote devices can be in conjunction with the AIM16 below, or the controller can be programmed via the TRS-80 to initiate a sequence of **up to thirteen events** in response to an external trigger.

and you can also monitor

Measure light level, temperature, sound level, pressure, pH, humidity, fluid level, acceleration, battery voltage. Most physical parameters you can think of can be monitored by your TRS-80 and the appropriate sensor with the AIM16 analog to digital converter from CmC.

The AIM16 converts 16 analog inputs (expandable to 256) within the range of 0 to 5.12 volts with 8-bit resolution.

30-day money-back guarantee

TRS-80 Set 1a—Monitoring; 16 analog inputs
TRS-80 Set 2—Controlling without Monitor with 8 digital inputs/8 digital outputs and clock/calendar function.
TRS-80 Set 3—Controlling Add-on for use with Set 1.
each set **$295.00**

Visa/Master Charge. Mention this magazine for a 5% discount.

Connecticut microComputer, Inc. ✓497 CmC

34 Delmar Drive, Brookfield, CT 06804, (203) 775-4595, TWX: 710 456-0052

✓See List of Advertisers on page 306

If thou doth protest too much, use your 80 to generate nasty letters of complaint.

Computerized Complaint

Dennis J. Gillig
708 Hingham Lane
Schaumburg, Illinois 60193

Evil and injustice are rampant in the land: nameless, faceless people harass us from credit card companies, politicians promise everything at election time and forget later, and computers send us form letters instead of service.

Good news! Here's a powerful new weapon. You can use your trusty computer to rattle their cages. This weapon works especially well against machines turned monsters by programmers, and operators and executives that have forgotten that flesh and blood exist out here in the real world.

When you read in the papers about your congressman voting against your desires you can use this program to fire a letter to him/her. When a department store sends you the ninth erroneous bill with that same overcharge (plus interest) on a computerized form saying they are about to repossess your microwave if you don't pay, you can use this program to send that blasted computer a piece of your mind.

The Basic of Writing a Nasty Letter

The basic element of a letter to get action are in the program. As you will see, you'll be able to add new forms to it for your specific needs. In fact, I'd appreciate printouts of any super letters you make up. If we get some

Continues to 279

Complaint Letter

From: Dennis J. Gillig
7822 Berkshire Drive
Hanover Park, ILL. 60103

To: Wonderful Drapery and Flange Com., Inc.
231456 East North West South Street
Sing Sing, NY 91788278

Attn: Carter MC Jimmy

This is contact number 1 with you about this complaint. I have a complaint about your low quality drapes, model 4345. I don't like the way they fade after 14 years of use.

The facts are:
1. Velvateen fiberglass rots with age.
2. The tie backs are only nine inches long and will not fit around the curtain.
3. I paid $2.00 for them at a garage sale and feel the re-sale is not too good.

This is what I want done:
Since you have a life time guarantee please replace them.

I do expect an immediate reply!

Figure 1.

Complaint Letter

From: Dennis J. Gillig
703 Hingham Lane
Schaumburg, ILL. 60103

To: Congressman Forest Trees
Capital Hill
Washington, DC 00000

Attn:

This is contact number 99 with you about this complaint.

Please sit back and RELAX.
I need your undivided attention. Prop your feet on your desk, tell your secretary to hold all calls, turn off the intercom, take a swig of coffee, a deep breath and concentrate on what I have to say.

I have a complaint about your vote against April Fool's Day as a national holiday.

I don't like your assumption that America is not ready for a day to commemorate congress.

The facts are:
America is ready for congress to take a holiday.

This is what I want done:
1. Declare an immediate vacation for congress of 6 months twice a year.
2. The above will do it all since no man's wealth and rights is in more jeapordy than when congress is in session.

A reply is not required.

Figure 2.

YORK 10

✓482 **BASF-DPS**

WORLD STANDARD TAPE

DATA TRAC C-10

- PROFESSIONAL 5 SCREW SHELL
- MONEY BACK GUARANTEE
- 1 DOZ. BULK PACK, $10 SENT POSTPAID

Calif. residents add 6% sales tax

YORK 10 Computerware

24573 Kittridge St., Dept. M Canoga Park, CA 91307

IT'S HERE!

A POWERFUL

EASY TO USE

SMALL BUSINESS

INVENTORY

PROGRAM

- Menu Driven • Easy Editing (8 Fields)
- Scroll Display Forward & Back Items in Memory
- Paper Print Out (With Total Cost)
- Holds & Dumps up to 150 Items On Disk Ver. 250 On Tape Ver. (150 Per Disk Filename)
- Instring Search Description & Supplier + 3 Equality Searches (Totals All Costs)
- Sorts Items by Number

Disk + Tape Ver. $99 — Tape Ver. $49
Reg. TRS 80* (48K) Model I

✓239 JOSEPH BROTHERS

7311 Van Nuys Blv. Rm 5, Van Nuys, Ca 91405

Demo By Appointment (213) 994-2293

*A Trademark Tandy Corp.

Dynamic Report Generator

No Programming Required

- Maintain different data files, each with its own set of internal logical relationships.
- Permits user to define customized report formats and column headings.
- Specify arithmetic relationships between columns.
- Automatic sorting and file compression.
- Keyed index for rapid retrieval of data.
- Redefine index by exchanging it with other report columns.
- Flexible add, delete, and list modes.
- Edit mode allows headings and arithmetic relationships to be altered without re-entering data.
- List mode allows for selected ranges and optional sub-totals.

FOR USE ON 48K—TRS—80 MOD 1, 1 DISK AND PRINTER.

PRICE: $74.95 INCLUDES DISK, 44 PAGE BOOKLET, SHIPPING AND HANDLING.

✓242

DYNAMIC SOFTWARE

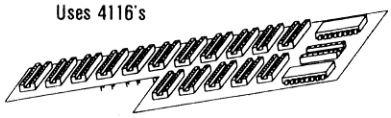
58-04 208th Street, Bayside, New York 11364

Portions copyrighted by Microsoft, 1980.
TRS-80 is a registered trademark of Tandy Corp.

TRS-80 MODEL 1

INTERNAL MEMORY

Uses 4116's



Increases RAM to 32K inside the keyboard unit. No soldering or other modifications (plugs into RAM sockets). Assembled & tested with detailed instructions. Shipped postpaid in (Continental) U.S. within 48 hours. ONE YEAR GUARANTEE: 15 DAY RETURN PRIVILEGE.

$47.50 Less RAM
$79.50 w/16K RAM

Send SASE for free brochure.

HOLMES ENGINEERING ✓401

6246 West 3705 South
Salt Lake City, UT 84120
(801) 967-2324

master charge — VISA

APARTMENT MANAGEMENT SYSTEMS...

*TM Tandy Corp.

(Using the TRS-80 MOD II*)

...for first-time computer users & small real estate operators.

EASILY HANDLES ALL RECORD-KEEPING & CORRESPONDENCE FOR 200–2,000 RENTAL UNITS ... IN MINUTES!

NO EXPERIENCE NECESSARY

✓99

Dealerships Available

CCS

Complete financial recordkeeping & printed reports generated for all tenants, such as late charges due and paid, reports of amounts due, financial history by month and category & management information and payment history files and much, much more!

For further information, call or write:

CORNWALL COMPUTER SYSTEMS
(201) 238-5757
4 CORNWALL DR., E. BRUNSWICK, NJ 08816

NEW

POCKET COMPUTER NEWSLETTER

P.O. BOX 232, Seymour, CT 06483

FOR POCKET COMPUTER USERS!

News and Product Reviews
Programming Tips
Operating Timesavers
Tutorials
Customizing Your Unit
Short Cuts
Practical Programs
Technical Details
Inside Information
Application Forums
—and— more!

✓127

☐ YES! Sign me up as a charter subscriber. Enclosed is my $20.00 for 10 issues. ($24 to Canada. $30 elsewhere.)
☐ Not sure. Enclosed is $2 for a sample issue.

Name _____
Addr _____
City/St _____ Zip _____

MURDER IN THE MANSION And Other Computer Adventures In Pocket-BASIC for the TRS-80

10 brand-new exciting tested ready-to-run game programs for the pocket computer, or any BASIC micro, including Saturn Death, Lost Safari, Buried Treasure, Black Pearl Scrambled Egg, Barrel of Apples and more, 64-page book. **$5.95**

POCKET COMPUTER PROGRAM WORKSHEETS

Pocket-BASIC Coding Form for the TRS-80, or any BASIC micro, makes writing programs easy, space for memory labels. 50-sheet pad **$2.95**

Send check or money order plus $1 shipping for each item ordered to:

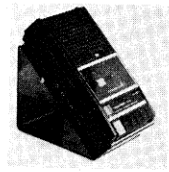
✓491 ARCsoft
Box 132 P
Woodsboro, MD
21798

---

tired?

of not being able to read the digital counter without changing positions every time?—Then try the **DATA VIEW**

Specifically designed to position the recorder at the proper angle for effortless viewing of the counter.



Constructed of durable transluscent acrylic in a beautiful smoked gray tint with slip resistant padded feet.

Only 8.95 each
Add 2.00 for shipping and handling
California residents add 6% sales tax.

TO ORDER: Send check or money order only to:
REM TRON
P.O. Box 2280
Santa Clara, CA 95055 ✓499

NO COD'S PLEASE

*Exatron stringy floppy version also available for 5.95. Ideal as desk calculator stand also. Size 5½" wide x 9" long.

*Exatron is a registered trademark of Exatron, Inc.

ACE COMPUTER PRODUCTS of Florida Inc. ✓265

CHIPS AHOY!

SPECIAL OFFER

Character generator chip with lowercase descenders

$29

installation instructions included
*** with pencil modification**

Send certified check or money order
Allow two weeks for personal check
Florida residents add 4% sales tax

ACE COMPUTER PRODUCTS
1640 N.W. 3rd STREET
DEERFIELD BEACH, FLA. 33441

✓See List of Advertisers on page 306

DISCOUNT Ad#13 SOFTWARE

✓ out our new items.

CP/M users: specify disk systems and formats. Most formats available.

	DISK WITH MANUAL / MANUAL ONLY
CP/M*	
ARTIFICIAL INTELLIGENCE	
✓ Medical	$449/$40
✓ Dental	$449/$40
COMPLETE BUS. SYSTEM	
Creator	$269/$25
Reporter	$169/$20
Both	$399/$45
COMPUTER CONTROL	
✓ Fabs	$159/$20
UltraSort II	$159/$25
COMPUTER PATHWAYS	
Pearl (level 1)	$ 99/$25
Pearl (level 2)	$299/$40
Pearl (level 3)	$549/$65
DIGITAL RESEARCH	
CP/M 2.2	
NorthStar	$149/$25
TRS-80 Model II (P&T)	$159/$35
Micropolis	$169/$25
Cromemco	$189/$25
PL/I-80	$459/$35
✓ BT-80	$179/$25
Mac	$ 85/$15
Sid	$ 65/$15
Z-Sid	$ 95/$15
Tex	$ 70/$15
DeSpool	$ 50/$10
DYNAMIC MICRO-PROCESSOR ASSOC.	
✓ Ascom	$109/$15
CBS	$369/$45
✓ DMA-DOS	$179/$35
GRAHAM-DORIAN	
✓ General Ledger	$729/$40
✓ Acct Receivable	$729/$40
✓ Acct Payable	$729/$40
✓ Job Costing	$729/$40
Payroll	$493/$40
Inventory	$493/$40
Cash Register	$493/$40
Apartment Mgt	$493/$40
KEY BITS	
String/80	$ 84/$20
✓ String/80 (source)	$279/$na
WordSearch	$179/$25
MICRO-AP	
S-Basic	$269/$25
Selector III	$269/$25
Selector IV	$469/$35
MICRO DATA BASE SYSTEMS	
HDBS	$269/$35
MDBS	$795/$40
✓ DRS or QRS or RTL	$269/$35
✓ MDBS PKG	$1295/$60
MICROPRO	
WordStar	$324/$60
✓ Customization Notes	$ 89/$na
Mail-Merge	$114/$25
WordStar/Mail-Merge	$434/$85
✓ DataStar	$249/$60
WordMaster	$119/$40
SuperSort I	$199/$40
MICROSOFT	
Basic-80	$294/$30
✓ Basic Compiler	$329/$30
✓ Fortran-80	$349/$30
Cobol-80	$574/$30
Macro-80	$144/$20
Edit-80	$ 84/$20
MuSimp/MuMath	$224/$25
MuLisp-80	$174/$20
ORGANIC SOFTWARE	
TextWriter III	$111/$20
DateBook	$269/$25
OSBORNE	
General Ledger	$ 59/$20
Acct Rec/Acct Pay	$ 59/$20
Payroll w/Cost	$ 59/$20
✓ All 3	$129/$57
All 3 + CBASIC-2	$199/$71
PEACHTREE*	
General Ledger	$399/$40
Acct Receivable	$399/$40
Acct Payable	$399/$40
Payroll	$399/$40
Inventory	$399/$40
Property Mgt	$799/$40
CPA Client Write-up	$799/$40
Mailing Address	$349/$40
SOFTWARE WORKS	
Adapt	$ 69/$na
Ratfor	$ 86/$na
SOHO GROUP	
MatchMaker	$ 97/$20
WorkSheet	$177/$20
STRUCTURED SYSTEMS	
GL or AR or AP or Pay	$599/$40
Inventory Control	$449/$40
✓ Analyst	$199/$25
✓ QSort	$ 89/$20
SUPERSOFT	
✓ Forth (8080 or Z80)	$149/$25
✓ Diagnostic II	$ 84/$20
Other	less 10%
TCS	
GL or AR or AP or Pay	$ 79/$25
All 4	$269/$99
WHITESMITHS	
"C" Compiler	$600/$30
Pascal (incl "C")	$850/$45
"DATA BASE"	
FMS-80	$649/$45
dBASE II	$629/$50
Condor	$599/$30
T.I.M.	$329/$35
"PASCAL"	
✓ Pascal/MT+	$429/$30
✓ Pascal/Z	$349/$30
Pascal/UCSD	$299/$30
Pascal/M	$149/$20
"WORD PROCESSING"	
✓ SpellGuard	$249/$25
Spell Binder	$349/$45
✓ Magic Wand	$289/$45
✓ VTS/80	$489/$65
"OTHER GOODIES"	
Tiny "C"	$ 89/$50
Tiny "C" Compiler	$229/$50
CBASIC-2	$ 89/$15
Nevada Cobol	$129/$25
MicroStat	$224/$15
Vedit	$ 99/$15
✓ Prof Time Bill (Asyst)	$549/$40
✓ ESQ-1	$1349/$50
✓ MiniModel	$449/$50
✓ StatPak	$449/$40
✓ Micro B +	$229/$40
✓ BSTAM	$129/$10
APPLE II*	
MICROSOFT	
Softcard	$292
✓ Fortran	$179
Cobol	$574
PERSONAL SOFTWARE	
Visicalc	$122
CCA Data Mgr	$ 84
Desktop/Plan	$ 84
Zork	$ 34
PEACHTREE*	
General Ledger	$224/$40
Acct Receivable	$224/$40
Acct Payable	$224/$40
Payroll	$224/$40
Inventory	$224/$40
"OTHER GOODIES"	
Super-Text II	$127
Data Factory	$129
✓ DB Master	$159
Ledger Plus	$549
✓ Charles Mann	less 15%
✓ STC	less 15%

ORDERS ONLY—CALL TOLL FREE VISA • MASTERCHARGE

1-800-854-2003 ext. **823** • **Calif. 1-800-522-1500** ext. **823**

Overseas—add $10 plus additional postage • Add $2.50 postage and handling per each item • California residents add 6% sales tax • Allow 2 weeks on checks, C.O.D. ok • Prices subject to change without notice. All items subject to availability • ®—Mfgs. Trademark.

✓ 440

THE DISCOUNT SOFTWARE GROUP
6520 Selma Avenue, #309 • Los Angeles, CA 90028 • (213) 666-7677

Complaint Letter

From the computer of:
Dennis J. Gillig
703 Hingham Lane
Schaumburg, ILL. 60103

To the computer of:
VRE Computerized Betting Service
2312 W. 33rd Street
Kildare, Ohio 00001

Dear fellow computer,

We have a problem. I figured (I do a lot of that) that I would write you directly since humans usually end up blaming us computers for their foul-ups anyway.

The problem concerns your daily betting bulletins.

I don't like the accuracy of the billing of the betting to me.

The facts are:
1. On September 2 your records show I bet on whether Teddy's mother would let him run—my bet was against not for.
2. On August 5th you recorded my bet as the cubs winning the world series—I dream but don't bet.
3. On October 1 you say I bet Carter would ask Rosalynn if he couldn't run she would run instead—no bet.

This is what I want done:
1. Get your act together.
2. Refund my losses of $1.49

I do expect an immediate reply

Figure 3.

". . . operators and executives . . . have forgotten that flesh and blood exist out here in the real world."

Program Listing.

```
30 CLEAR4000:DEFSTRA-F:DEFINTG-Z:DIMA(33):D0="COMPUTERI
     ZED CONSUMERISM PROGRAM":D1=STRING$(64,"-")
40 CLS:PRINTTAB(10)D0CHR$(13)D1:PRINT@192,"CHOOSE THIS:
     "TAB(25)"TO DO THIS:"CHR$(13):PP=0
50 PRINT"<1>"TAB(25)"CREATE NEW LETTER":PRINT"<2>"TAB(2
     5)"REVIEW <DISK> FILE":PRINT"<3>"TAB(25)"REVIEW <T
     APE> FILE":PRINT"<4>"TAB(25)"INSTRUCTIONS":INPUTG
60 ONG GOTO 70 , 15040 , 15010 , 15130
70 CLS:PRINTTAB(10)D0CHR$(13)D1:PRINT@192,"CHOOSE THIS:
     "TAB(25)"TO DO THIS:":PRINT:G=0
80 PRINT"<1>"TAB(25)"STANDARD LETTER"
90 PRINT"<2>"TAB(25)"COMPUTER TO COMPUTER"
100 PRINT"<3>"TAB(25)"SIT BACK AND RELAX"
110 PRINT"<4>"TAB(25)"(RESERVED)
120 PRINT"<5>"TAB(25)"(RESERVED)
130 PRINT"<6>"TAB(25)"(RESERVED)
140 PRINT"<7>"TAB(25)"(RESERVED)
150 PRINT"<8>"TAB(25)"(RESERVED)"
160 PRINT"<9>"TAB(25)"(RESERVED)":INPUTG:IFG>9GOTO 70
170 CLS:PRINTTAB(10)D0CHR$(13)D1:PRINT@192,"OFFENDING C
     OMPANY
STREET
CITY
STATE
ZIP
ATTN:
DATE"
180 FORI=1TO7:READP:READL:GOSUB10000:A(I)=B:NEXT
190 GOSUB20010:PRINT"MY COMPLAINT IS ABOUT ":P=281:GOSU
     B 15210 :PRINT@768,"INSERT SPECIFIC PRODUCT, SERVI
     CE, OR ISSUE":L=255:GOSUB10000:A(8)=B
200 GOSUB20010:PRINT"I DON'T LIKE ":P=281:L=255::GOSUB
     15210 :PRINT@768,"INSERT SHORT COMMENT ABOUT <WHAT
     > IS WRONG.  (MAX. 256 LETTERS AND SPACES.)":GOSUB
     10000:A(9)=B
210 I=10:S=1
220 GOSUB20010:PRINT"THE FACTS ARE:":PRINT
230 P=281:GOSUB 15210 :GOSUB 15220 :PRINT@P,S:P=P+3:GOS
     UB10000 :A(I)=B:I=I+1:S=S+1:IFI=21GOTO 270
240 A="":PRINT@768,CHR$(31):INPUT"CHOOSE:  <M>ORE FACTS
```

Program continues

good ones we'll share them with the editors and perhaps they will print some of the best.

Program Description

Please refer to Program Listing 1. It's long but it packs a punch. Normally, after writing a program I put it through another program that packs lines and removes all deadwood. However, you'll find this version easier to read.

The idea is to standardize protest or complaint letters with a minimum of fuss. If we don't want to take the time to go through the usual process of typing or writing a complaint letter, this program quickly gets the facts printed and on their way to the offender.

You are first asked if this is to be a new (create new file) letter or input from disk or tape. The data on tape or disk contains only the minimum facts you previously input. Sort of like having a carbon copy but no messy carbon. If you elect to start a new file you can select from three standard forms. The first is in bare-bones style and useful for just about any occasion. (See Fig. 1.) The second letter is from your computer to theirs. (See Fig. 3.) The third letter is to the big shot; which can be sent to the president of the offending company or your congressman. (See Fig. 2.)

Your first duty is to input the offender. Your name and address should be inserted where mine appears in the program and will automatically be inserted when printed. (Change line 400).

Note that program lines such as 170 are formatted with the down arrow. This saves memory since it is not necessary to type print to cause the display to drop a line. It does make the listing appear longer. Please note that this is formatted for my Integral Data IP-125 printer. Some of the control codes will not make sense to other printers.

Let It All Hang Out

You get to tell them what you don't like, what is wrong, the facts, what you want done, and whether or not you want to reply. You also tell them how many previous contacts you have made with the company via telephone, letter, etc.

When all information has been entered you'll be asked to ready the printer. Provisions are made to make more copies if needed. You can set margins by answering two questions. (Both margins are calculated from the left.) Then you can save on tape or disk if needed. I added a safeguard for disks: as the data is brought in from disk it is also displayed on the screen which ensures me I have the right file.

A few friends have some far out form letters they are adding to the area between lines 4000 and 9000. If you are severely paranoid this could be fantastic therapy for you. You could also convert this to love letters. It can also serve as a practical tool if you have a small business. In real estate sales we have a few standard letters we need to send where the basic information is about the same. This will help me send those just listed a house on your block or just sold a house on your block letters with ease.

If you intend to add other forms to this program you'll only need to add the name in the menu and the contents at the appropriate line from 4000 to 9000. If only a first paragraph is desired make the computer go to line 1010 to pick up the balance of the letter.

By changing the series of questions asked, you can use it to fill out a bill, invoice, or whatever you choose.

The first line in all my programs uses the same format. Put a REM after the CLS if you choose. (Ever save the program using another program's name and thereby wiping out some very valuable code? Put the name up front and don't save unless you list the beginning.) It also helps to know the version and date since my programs are after rewritten.

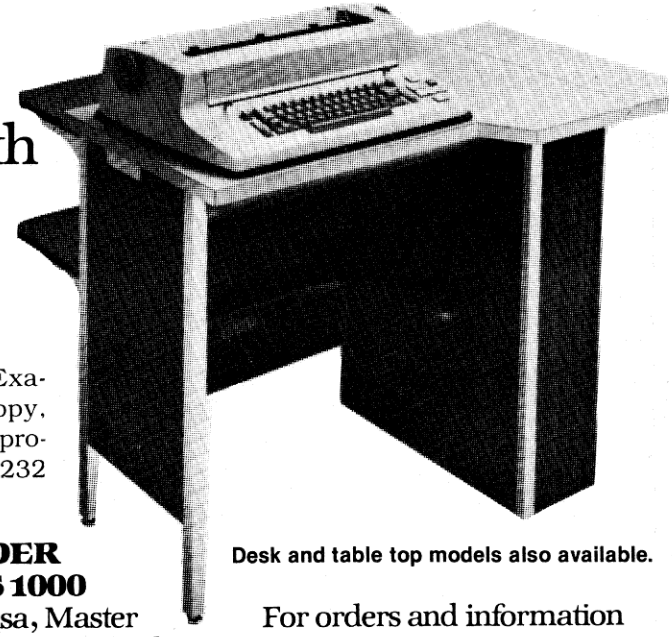
If you can tie a shoe and spell interface you should be able to master this program. If you don't like the program you may send me a complaint letter.■

```
     ENTERED- <R>EVIEW- <C>ONTINUE";A:IFA="R"GOTO 1534
     0
250 IF A="M"GOTO 220
260 IFA="C"GOTO 270 ELSE 240
270 I=20:S=1
280 GOSUB20010:PRINT"THIS IS WHAT I WANT DONE:":PRINT:G
     OSUB 15210 :GOSUB 15220 :P=281:PRINT@P,S:P=P+3:GOS
     UB10000 :A(I)=B:S=S+1:I=I+1:IFI=31GOTO 320
290 A="":PRINT@768,CHR$(31):INPUT"CHOOSE:  <M>ORE DEMAN
     DS ENTERED- <R>EVIEW- <C>ONTINUE";A:IFA="M"GOTO 28
     0
300 IF A="R"GOTO 15380
310 IFA="C"GOTO 320 ELSE 290
320 GOSUB20010:INPUT"DO YOU WANT A REPLY (Y/N)";A(31):A
     (31)=LEFT$(A(31),1)
330 GOSUB20010:INPUT"HOW MANY TIMES HAVE YOU COMMUNICAT
     ED WITH THEM IN THE PAST";S2
340 GOSUB20010:INPUT"READY PRINTER AND PRESS <ENTER>";A
     :INPUT"HOW MANY COPIES";J:POKE16425,0
350 INPUT"WHAT IS LEFT MARGIN";ML
360 INPUT"WHAT IS RIGHT MARGIN";MR:PRINT@532,"** OUTPUT
     TO PRINTER **"
370 FORX1=1TOJ
380 LPRINTTAB((MR-ML)/2);"COMPLAINT LETTER":IFH=2THENLP
     RINTCHR$(13)CHR$(13)TAB(ML)FROM THE COMPUTER OF:":
     GOTO320
390 LPRINTSTRING$(5,13);TAB(ML)"FROM:  "
400 LPRINTTAB(ML)"DENNIS J. GILLIG";CHR$(13);TAB(ML);"7
     08 HINGHAM DRIVE";CHR$(13);TAB(ML);"SCHAUMBURG, IL
     . 60193";CHR$(13)TAB(ML)"PHONE: 312/980-4750"STRIN
     G$(3,13)
410 IFH=2THENLPRINTTAB(ML)"TO THE COMPUTER OF:":GOTO 43
     0
420 LPRINTTAB(ML)"TO:"
430 FORX=1TO7:LPRINTTAB(ML)A(X):NEXT:LPRINTSTRING$(3,13
     )
440 ONGGOSUB 1000 , 2000 ,3000,4000,5000,6000,7000,8000
     ,9000
450 NEXT
460 GOSUB 15230 :RUN
1000 LPRINTTAB(ML)"THIS IS CONTACT NUMBER  ";S2+1; "  W
     ITH YOU ABOUT THIS COMPLAINT.";CHR$(13)
1010 IFA(8)<>""LPRINTTAB(ML)"I HAVE A COMPLAINT ABOUT:"
     :I=8:LPRINTTAB(ML);:GOSUB 18000 :LPRINTCHR$(13)
1020 IFA(9)<>""LPRINTTAB(ML)"I DON'T LIKE:":I=9:LPRINTT
     AB(ML);:GOSUB 18000 :LPRINTCHR$(13)
1030 LPRINTTAB(ML)"THE FACTS ARE:":FORS=1TO10:I=S+9:IFA
     (I)=""GOTO 1050
1040 LPRINTTAB(ML);:GOSUB 18000 :NEXT:LPRINTCHR$(13)
1050 LPRINTCHR$(13)TAB(ML)"THIS IS WHAT I WANT DONE:":F
     ORS=1TO10:I=S+19:IFA(I)=""GOTO 1070
1060 LPRINTTAB(ML);:GOSUB 18000 :NEXT:LPRINTCHR$(13)
1070 IFA(31)="Y"LPRINTCHR$(13)TAB(ML)"I DO EXPECT AN IM
     MEDIATE REPLY":GOTO 1090
1080 LPRINTCHR$(13)TAB(ML)"A REPLY IS NOT REQUIRED."
1090 LPRINTCHR$(11):RETURN
2000 REM COMPUTER TO COMPUTER
2010 LPRINTTAB(ML)"DEAR FELLOW COMPUTER,";CHR$(13)
2020 LPRINTTAB(ML)"WE HAVE A PROBLEM.  I FIGURED (I DO
     A LOT OF THAT)":LPRINTTAB(ML)"THAT I WOULD WRITE Y
     OU DIRECTLY SINCE HUMANS USUALLY END UP BLAMING US
     ":LPRINTTAB(ML)"COMPUTERS FOR THEIR FOUL-UPS ANYWA
     Y."
2030 LPRINTTAB(ML)"I HOPE THAT TWO COMPUTERS CAN GET TH
     IS FIGURED OUT.
2040 GOTO1010
3000 LPRINTTAB(ML)"PLEASE SIT BACK AND ";CHR$(1);"RELAX
     ";CHR$(2);"."
3010 LPRINTTAB(ML)"I NEED YOUR UNDIVDED ATTENTION.  PRO
     P YOUR FEET ON YOUR DESK,":LPRINTTAB(ML)"TELL YOUR
      SECRETARY TO HOLD ALL   CALLS, TURN OFF THE INTER
     COM, TAKE A SWIG OF COFFEE,"
3011 LPRINTTAB(ML)"A DEEP BREATH AND CONCENTRATE ON WHA
     T I HAVE TO SAY."CHR$(13)
3020 GOTO 1010
4000 GOTO70:REM RESERVED FOR LETTER
5000 GOTO70:REM RESERVED FOR LETTER
6000 GOTO70:REM RESERVED FOR LETTER
7000 GOTO70:REM RESERVED FOR LETTER
8000 GOTO70:REM RESERVED FOR LETTER
9000 GOTO70:REM RESERVED FOR LETTER
10000 B="":A=""
10010 PRINT@P,STRING$(L,136);
10020 PRINT@P,"*";:FORK=1TO20:NEXT:PRINT@P," ";:FORK=1T
     O20:NEXT:A=INKEY$:IFA=""THEN10020
10030 IFA=CHR$(13)RETURN
10040 IFA=CHR$(8)THENIFA<>""THEN PRINTA;:IFLEN(B)=0GOTO
     10020ELSEB=LEFT$(B,LEN(B)-1):P=P-1:PRINT@P,STRING$
     (L-LEN(B),136);:GOTO10020
10050 PRINT@P,A;:B=B+A:P=P+1:IFLEN(B)=LGOTO10070
10060 GOTO10020
10070 A=INKEY$:IFA=CHR$(13)RETURN
10080 IFA=CHR$(8)THENGOTO10040ELSE10070
15000 REM SERIES OF SUBROUTINES
15010 GOSUB20010:PRINT@468,"**   READY TAPE   ***":GOSU
     B20000
15020 GOSUB20010:PRINT@468,"**** READING TAPE ****
15030 FORI=1TO31:INPUT#-1,A(I):PRINTA(I):NEXT:GOTO 1507
     0 :REM FOR PRINT-OUT
```

Program continues

The DATA-TRANS 1000

A completely refurbished **IBM** Selectric Terminal with built-in **ASCII** Interface.



***FOR YOUR TRS-80 WITH OR WITHOUT EXPANSION INTERFACE. AVAILABLE WITH CENTRONICS TYPE PARALLEL PORT.**

Features:

- 300 Baud Serial
- 14.9 characters per second printout
- Reliable heavy duty Selectric mechanism
- RS-232C Interface
- Documentation included
- 60 day warranty—parts and labor
- High quality Selectric printing Off-line use as typewriter
- Optional tractor feed available
- 15 inch carriage width

Also works with Exatron's Stringy floppy, for fast loading of programs. (Has RS232 built in stringy)

HOW TO ORDER DATA-TRANS 1000

1. We accept Visa, Master Charge. Make cashiers checks or personal check payable to:

DATA-TRANS

2. All orders are shipped F.O.B. San Jose, CA
3. Deliveries are immediate

Desk and table top models also available.

For orders and information

DATA-TRANS

45277 Fremont Blvd., #7 ✓274
Fremont CA 94538

Phone: **(408) 263-9246**

LYNX

makes your TRS-80 a whole new animal.

LYNX is more than a telephone coupler. LYNX is a one-piece total telephone linkage system for TRS-80 Level I and II computers, with or without expansion interface. No RS-232 required for true originate/answer direct-connect telephone operation. DOS-compatible EMTERM "smart terminal" software furnished on cassette. Already have a favorite TRS-80 program? Use it with LYNX.

With LYNX you can tap the Source or the new Compu-Serve Information Utility. Control university, business and personal computers from a remote location. Communicate via electronic mail. Learn from library data bases. Profit by instant financial market info.

Auto-Answer Optional.

All for only $279.95 at your dealer.

Includes all cables, "EMTERM" terminal program, instruction manual.
FCC Registration Number: A909KE-69488-DM-N

ESI LYNX

123 LOCUST STREET LANCASTER, PENNSYLVANIA 17602
Phone 717/291-1116

DEALER INQUIRIES INVITED. ✓278

MODEL III & APPLE, TOO!

"TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation"

```
15040 PP=2:GOTO 15300
15050 GOSUB20010:PRINT@468,"** READING DISK **":OPEN"I"
      ,1,A
15060 FORI=1TO32:INPUT#1,A(I):PRINTA(I):NEXT
15070 GOSUB20010:INPUT"DO YOU WANT A PRINT-OUT OF THIS
      DATA (Y/N)";A:IFA="N"GOTO40
15080 GOSUB20010:PRINT@468,"**  READY PRINTER  **":GOSU
      B20000
15090 FORI=1 TO 32:IFA(I)=""THEN 15110
15100 LPRINTA(I)
15110 NEXT:GOTO 40
15120 PRINT"NO SUCH FILE":GOTO 40
15130 REM INSTRUCTIONS
15140 CLS:PRINT"WHEN YOU NEED ACTION CALL ON YOUR COMPU
      TER TO ASSIST YOU IN THE BATTLE AGAINST EVIL AND I
      NJUSTICE.
15150 PRINTSTRING$(64,"*");"YOU GET TO SELECT FROM THRE
      E FORM LETTERS.

FIRST- PLAIN STATEMENT.  USEFUL TO A COMPANY OR POLITIC
      IAN.

SECOND- COMPUTER TO COMPUTER.  FOR THOSE CHARGE CARDS A
      ND OTHER IMPERSONAL ORGANIZATIONS

15160 PRINT"THIRD- TO THE BIG SHOTS.  HOPEFULLY YOU'LL
      GET THEIR ATTENTION.

OTHER STYLES CAN BE DEVELOPED AS YOU NEED THEM AND ADDE
      D.
";STRING$(64,"*")
15170 GOSUB20000
15180 CLS:PRINT"YOU CAN SAVE ON TAPE OR DISK BUT KEEP S
      EVERAL HARDCOPIES.  SUGGESTION: MAKE FOUR COPIES.
      1) TO OFFENDING PERSON OR COMPANY.  2)TO THIRD PAR
      TY IF NEEDED.  3) FOR YOUR FILES.  4)  TO OFFENDIN
      G PERSON OR COMPANY IF THEY FAIL TO COMPLY
15190 PRINT"
JUST ANSWER THE QUESTIONS AND ONLY ONE WARNING ----EACH
       ENTRY IS LIMITED TO 256 LETTERS AND SPACES.



HAVE FUN AND HERE'S HOPING YOU WIN THE DAY.

SAVING ON TAPE OR DISK SAVES THE PERTINENT DATA FOR FUT
      URE USE.
15200 GOSUB20000:GOTO40
15210 PRINT@704,D1:RETURN:REM SEPARATES INSTRUCTIONS FR
      OM DATA ON SCREEN
15220 PRINT@768,"ENTER UP TO 10 ITEMS  (EACH MAX. 256 L
      ETTERS AND SPACES).":RETURN
15230 REM SAVE ON TAPE OR DISK
15240 PRINT@192,CHR$(31):A="": INPUT"DO YOU WANT TO SAV
      E ON
<T>APE
<D>ISK
<Q>UIT";A:IFA="Q"GOTO40
15250 IFA="D"GOTO 15300
15260 IFA<>"T"GOTO 15240
15270 GOSUB20010:INPUT"PREPARE RECORDER - TYPE NAME OF
      FILE AND PRESS <ENTER> WHEN READY";A
15280 GOSUB20010:PRINT@468,"** RECORDING DATA **":PRINT
      #-1,A
15290 FORI=1TO32:PRINT#-1,A(I):PRINT"*";:NEXT:GOTO40
15300 GOSUB20010:INPUT"READY DISK AND INPUT

FILE NAME (MAX. 8 LETTERS)";A
15310 INPUT"DRIVE NUMBER";A1:A=A+":"+A1:REM FILE NAME
15320 IF PP=2 GOTO 15050
15330 PRINT@468,"** WRITING DISK **":OPEN "O",1,A:FORI=
      1TO32:PRINT#1,CHR$(34);A(I);CHR$(34);:NEXT:CLOSE:G
      OTO40
15340 FORI2=10TO20:GOSUB20010:PRINT"REVIEW OF FACTS

15350 PRINTA(I2):IFA(I2+1)=""GOTO 15370
15360 GOSUB20000:NEXT
15370 GOSUB20000:GOTO 240
15380 FORI2=20TO30:GOSUB20010:PRINT"REVIEW OF DEMANDS

15390 PRINTA(I2):IFA(I2+1)=""GOTO 15410
15400 GOSUB20000:NEXT
15410 GOTO290
18000 A="":A=A(I):L=LEN(A):K=1
18010 M1=MR-ML
18020 IFM1<=LGOTO 18050
18030 IFM1+K>LTHENM1=L-K
18040 IFM1>LTHENIFMID$(A,M1,1)<>" "THENM1=M1-1:GOTO 180
      40
18050 FORX=1TOM1
18060 LPRINTTAB(ML)MID$(A,K,1);:IFK=LTHEN 18090
18070 K=K+1:NEXT:LPRINTCHR$(13)
18080 IFK<LGOTO 18010
18090 RETURN
20000 INPUT"PRESS <ENTER> TO CONTINUE";C:RETURN
20010 PRINT@192,CHR$(31):RETURN
32000 DATA 217,25,281,25,345,25,409,2,473,5,537,20,601,
      8
```


Save With

Service Technologies

"Simply the Best"

ADD LOWER CASE TO ANY CENTRONICS PRINTER!... $89.00

ADD MOTOR CONTROL TO YOUR 779!..... $95.00

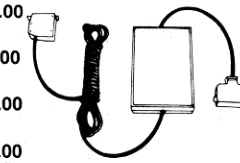
Our Conversion Kit I gives all Centronics printers the ability to print upper and lower case.....$89.00.
Optional customer defined character sets available
Our Conversion Kit II turns your motor on and off automatically. Increases the life of your printer:.....$95.00.
Both kits require NO soldering, etchcuts, software change, interface or program modifications. Installs in minutes with just a screw driver

We are the original Centronics add-on company. Don't be fooled by immatations!

NOW USE YOUR CENTRONICS PARALLEL PRINTER ON ANY COMPUTER WITH A SERIAL PORT!

AVAILABLE IN FOUR MODELS, ALL WITH SWITCHABLE BAUD RATES

CSP - 100
NO BUFFER $175.00
CSP - 200
256 CHARACTER BUFFER $225.00
CSP - 200X
X ON/X OFF PROTOCOL $340.00
CSP - 2000
2048 CHARACTER BUFFER $395.00



And more.....

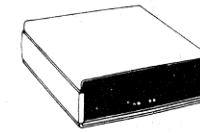
C-488 IEEE PARALLEL "LISTEN ONLY" TO CENTRONICS INTERFACE

- Input IEEE 488 GPIB, Hewlett Packard HPIB, or PET compatible
- Switchable device address
- Disable switch for address and parallel commands $125.00

PSI PARALLEL SWITCH ALLOWING TWO DEVICES TO SHARE ONE LINE PRINTER

- Two parallel input ports - one parallel output port
- Manual or remote switching control $125.00

SDP-1
A USER PROGRAMABLE SERIAL DATA PROCESSOR WITH THE CAPABILITY OF COMBINING MULTIPLE SERIAL DATA OPERATIONS



- Z-80 Microprocessor - controlled
- Buffer allocation, synchronous or asynchronous operation including transparent or non transparent mode.
- Code, word structure and buad rate conversions Ex. ASCII to EBCID or ASCII to BAUDOT
- Handles baud rates of 50-19,200 b.p.s
- Buffer size expandable from 4K - 64K RAM memory
- Audio cassette interface
- Independent and separately controlled input and output ports.

OUR QUALITY, SERVICE, WARRENTY AND PRICE CAN'T BE BEAT

To order please send check or money order to;

Service Technologies
32 Nightingale Rd.
Nashua, N.H. 03062
(603) 883-5369 ✓297

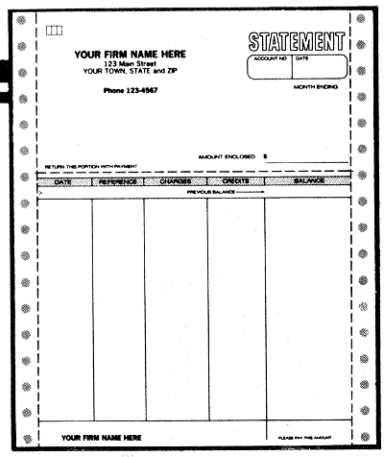
master charge VISA

Visa and Master Card accepted (include signature expiration date and phone #)

phone orders and inquirys always welcome

✓See List of Advertisers on page 306

TRS-80™ Compatible "carbonless" Continuous Statements

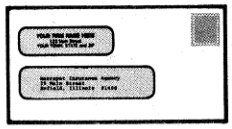


small quantities, low prices, fast delivery

Order as few as 500 statements imprinted with your firm name and address.

Only $27.95

NEBS 9062 Statements are software compatible with the TRS-80, Model 1, Level II, Accounts Receivable package #26-1555.



SPEED COLLECTIONS
Product 772 DU-O-VUE® Envelope (3⅝"x 6⅞") eliminates envelope addressing.

TRS-80 is a Trade Mark of the Radio Shack Co., Subsidiary of the Tandy Corp.

Product 9062 — Size 6"x 8½" detached. Prices include your firm name, address and phone in top section, plus your name only in lower section. Printed in black ink. Available in single (white) or duplicate (white, canary) continuous sets.

QUANTITY	SINGLE Product 9062-1	DUPLICATE Product 9062-2	Product 772 DU-O-VUE® Envelopes
10,000	$192.00	$355.00	$138.00
6,000	128.00	228.00	92.00
4,000	99.00	169.00	64.50
2,000	59.00	99.00	36.25
1,000	38.75	61.00	20.75
500	27.95	39.95	12.25

ORDER TODAY! MONEY-BACK GUARANTEE.
FAST SERVICE BY MAIL or PHONE TOLL FREE 1+800-225-9550 (Mass. residents 1+800-922-8560). It is our policy to ship within 6 working days following our receipt of your order.

Please ship: Date_____19____ **CODE 460**

_____**9062-1 STATEMENTS (Single)**

_____**9062-2 STATEMENTS (Duplicate)**

_____**772 DU-O-VUE® Envelopes**

_____**Information on continuous checks and other computer forms.**

HEADING TO BE PRINTED ON FORMS: (Please type or print)

STREET

CITY and STATE ZIP

PHONE

AUTHORIZED SIGNATURE

If you wish us to BILL and SHIP differently from above please indicate.

Nebs Computer Forms

✓194 *78 Hollis Street, Groton, Mass. 01450*

A division of New England Business Service, Inc.

COMPUTER HOBBYIST SPECIALS!

WHILE THEY LAST!!!! SAVE!!

Daisy Wheel Terminals

RS-232, used, off-lease. Features Diablo Hytype 1 printer, up to 30 CPS, plot & text modes, dual pitch and much, much more. Includes data, operation manual, schematics. "As-is" machines may need some service.

Add $40 for Hdlg. and Pkg. Pay Shipping When Delivered.

TESTED & FUNCTIONAL — NOW ONLY **$1299.00** ea.

"AS-IS"... ONLY **$899.00** ea.

SURPLUS

* "SELECTRIC" TYPEWRITER TERMINALS

15" "Selectric" typewriter terminals are complete with solenoid drivers and RS-232 Serial I/O circuitry. BCD or correspondence code. Each unit includes operational printer, power supply, and untested RS-232 I/O board. Features:

- Full KSR Capability
- 88 Character Set (Upper and Lower Case)
- 134.5 Baud I/O
- 132 Col.
- 14 CPS Rate
- Standard Typewriter KBD
- 117 VAC. 60 Hz Operation

No type element included. Line cord and some data included.

* Reg. Trademark of IBM Corp.

BDC Code Terminal ..... **$489.00** EACH

Correspondence Code Terminal ..... **$569.00** EACH

Printer Maintenance Manual ..... **$20.00** EACH

Add $20 For Hdlg. & Pkg. - Pay Shipping When Del.

Write or Call for our Bargain-Packed PERIPHERAL FLYER!!

Prices are Subject to Change on All Items

✓316

CFR Associates, Inc.

MAIL ORDERS: Box 144, Newton, N.H. 03858

PHONE ORDERS: 617/372-8536 (Sorry, No Collect Calls!) MasterCharge & VISA Welcome

WAREHOUSE: 18 Granite Street Haverhill, Mass. 01830

PACIFIC OFFICE SYSTEMS

COMPUTER INTERFACES & PERIPHERALS

- **POS-100 NRZ1 TAPE DRIVE CONTROLLER/FORMATTER** — Now your micro can read and write IBM/ANSI compatible NRZ1 format 9-track magnetic tapes. The POS-100 consists of S-100 bus card, 6' ribbon cable, tape drive controller card, cable to Pertec-Standard NRZ1 Tape drive, plus documentation and Z-80 or 8080 software (specifiy). Power is derived from tape drive and S-100 bus. Ship Wt.: 10 lbs. Suggested Retail Price $995.00
- **POS 103/202 "MIX or MATCH" MODEM** — Unique POS control design permits use in one housing of both Bell-compatible 103 (0-300 baud) and 202 (0-1200 baud) modem modules originally made by VADIC Corp. for a telephone company subsidiary. FEATURES: RS-232 serial Interface, auto-answer, auto-dial, LED display, telephone line interface via acoustic coupler, manual DAA, or auto-answer DAA (sold separately). FULLY ADJUSTED; no special tools required. 3,000 mile range over standard dial-up telephone lines. Ship wt.: 15 lbs.
  PRICES . . . . . POS 103 Modem — $199.95; POS 202 Modem — $299.95; POS 202 Modem w/Auto-Answer — $349.95; POS 103/202 Modem — $499.95; FCC-Approved Auto-Answer DAA — $125.00; Acoustic Coupler — $29.95.
- **POS DAISY-WHEEL PRINTER INTERFACE for TRS-80** — Will drive Diablo HyType I, HyType II, and Qume Q and Sprint 3 printers. Includes 1K user-available memory for custom print routines (such as graphics, bidirectional printing, etc.). Programmed to respond to print commands from BASIC ELECTRIC PENCIL™, and SCRIPSIT™ software. Draws its power from printer. Ship wt.: 5 lbs. Price $250.00
  Cables, each (Specify HyType I, HyType II, or Qume) . . . . . $ 25.00
- **POS ASCII INTERFACE for IBM I/O SELECTRIC** — This Centronics-style parallel printer interface will drive an IBM Model 731 or 735 I/O typewriter (EBCD and Correspondence codes). No software needed. Features on-board EPROM which holds up to 8 ASCII-to-IBM code tables for different type spheres. Closed-loop operation runs at maximum printer speed; stops and starts on a single character without loss of data. Requires +12VDC and ±5VDC power source. Ship wt.: 5 lbs. Price $249.95
  Power Supply (±5VDC, +12VDC, +24VDC for Solenoids on Printer) . . . .$ 49.95
- **CONVERT OFFICE SELECTRIC TO I/O TYPEWRITER** — Kit includes assembled solenoids, switches, wire harness, magnet driver PCB plus instructions for installation and mCPU interface. Price $150.00
- **"FORMALINER" Variable Width Forms Tractor** for 15" Selectrics . . . $95.00
- **GTE Model 560 ASCII SELECTRIC I/O Terminal** — With RS-232 Serial Interface and digital cassette deck for use as memory typewriter. Ship wt.: 100 lbs. Price, tested and adjusted $1,195.00
- **POS ASCII IBM SELECTRIC PRINTER** — 15" Selectric from GTE terminal cleaned and adjusted with POS Centronics-style ASCII printer interface. UC/LC, carbon and fabric ribbons. Compatible with TRS-80, Apple, SOL and other CPU parallel printer ports. Ship wt.: 75 lbs. Price $895.00

PACIFIC OFFICE SYSTEMS ✓153

2265 Old Middlefield Way Mountain View, Calif. 94043 (415) 493-7455

What's 64 characters long and disappears?

Line Loss

Hubert C. Borrmann
2840 S. Circle Drive
Colorado Springs, CO 80906

Occasionally in our daily lives we notice that something has suddenly disappeared. However much we look for it, it's gone.

Well, this is a fact of life, and we have to reconcile ourselves to the fact that this is the way it is, the way it was and the way it may always be.

I want to talk about something which is 64 characters long and suddenly disappears: A line from our TRS-80 screen.

This happens when we have to respond to a PROMPT to enter something. Whenever we type in the desired response and press ENTER, the line following the one where the cursor was, is suddenly gone.

This is a fact and we are probably willing to live with it. There is, however, something we can do about it. If we work with games or graphics, for instance, we can save the line in a string-variable. We can replace it on the screen when the program regains control after ENTER. Type in the seven-line program shown in the Program Listing. Run it and you will see the second line disappear. Now go into edit-mode and remove the quote (') from lines 40 and 60. Run it again.

Now we've solved the case of the wiped-out line.■

```
10  CLS:CLEAR 200
20  FOR N=0 TO 255:PRINT@N, "#";:NEXT N
30  PRINT@5,"ENTER ANY CHARACTER";
40  'B$=" ":FOR N=64 TO 127:B$=B$+CHR$(PEEK(15360+N)):NEXT N
50  INPUT A$
60  'PRINT@64,B$;
70  IF A$="END" THEN END ELSE 30
```

Program Listing

FIXED ASSET ACCOUNTING

Stop paying high professional fees for clerical work. This extremely flexible system will maintain all records which are related to fixed assets and depreciation.

* Any method: straight line, declining balance, ADR, sum of the years digits
* Projects depreciation for current & future years
* Complete audit trail with detailed fixed asset ledger, acquisition and disposal reports
* Computes investment tax credit and additional first-year depreciation
* Provides reports summarized by general ledger account, asset group, department, and more

System requirements are 32K and two or more disk drives for Model I, 64K with one or more disc drives for the Model II, and 32K with at least one disk drive for the Model III. All versions require Disk Basic and will run under either TRSDOS or NEWDOS.

FAAS-1 For Model I ..... $ 149
FAAS-2 For Model II ..... $ 189
FAAS-3 For Model III .. . $ 149

CASH FLOW PROJECTION

Get control over your personal finances. This easy-to-use system maintains a detailed analysis of your future cash requirements and estimated income, tracking the information you need to schedule payments, avoid minimum balance fees and forecast the amount of your uncommitted funds at any point in time for at least a year into the future. The tape versions require 16K & either Level II or Model III Basic. Disc versions require 32K, Disc Basic, at least one drive and will run under TRSDOS or NEWDOS.

Tape Versions	Disk Versions
TCASH-1 For Model I . . . $ 19.95	DCASH-1 For Model I . . . $ 24.95
TCASH-3 For Model III . . $ 19.95	DCASH-3 For Model III . . $ 24.95

C.O.D. $2.50 ADDITIONAL — CONN. RESIDENTS PLEASE ADD SALES TAX

THE SYSTEMWORKS ✓473

P.O. Box 359 Flood Road Marlborough, Conn. 06447

Attention TRS-80 Mod II owners: P&T CP/M® 2 has more to offer!

More Disk Storage 596K bytes with double density on standard single sided disk drives. It that's not enough, versions are available for double sided expansion drives (1.2M bytes per disk) and the Cameo Hard disk system (10M bytes.)

More CRT Functions P&T CP/M 2 has the most advanced screen driver available for the Mod II including: erase to end of line/screen, insert/delete line, cursor addressing, non-scrolling area on screen, and much more.

More Serial I/O Capabilities The serial drivers in P&T CP/M 2 support ETX/ACK, XON/XOFF, and request to send handshaking. Direct control of serial ports is also available for special applications.

More Documentation We provide the standard CP/M manuals and our own 150 page manual written specifically for P&T CP/M 2.

More Utilities We have added 14 of our own utility programs for the Mod II to the standard CP/M utilities.

More Useful System Functions P&T CP/M 2 has all sorts of useful features you won't find elsewhere: type-ahead buffer for keyboard input, system time of day clock, automatic program execution and lots more.

Prices

Standard P&T CP/M 2	$185
P&T CP/M 2 for Shugart 850 2 sided drives	$220
P&T CP/M 2 for Cameo Hard Disk system	$250

We also carry other software packages, single & double sided expansion drives and the Cameo Hard Disk System. Write for details.

PICKLES TROUT

Prepaid COD Mastercharge or Visa orders accepted
Shipping extra California residents add 6% sales tax ✓273

PICKLES & TROUT
P.O. BOX 1206, GOLETA, CA 93017, (805) 967-9563

CP/M is a trademark of Digital Research Inc TRS-80 is a trademark of Tandy Corp.

✓See List of Advertisers on page 306

A few enhancements to your favorite Shack utility.

Take T-Bug Higher

W. R. Stanley N4TF
City Route 13, 204 Avery Lane
La Grange, GA 30240

This article is written for those who have moved T-BUG to the high RAM range, possibly with the help of the article written by Irwin Rappaport (Get T-BUG High, p. 118) in the first issue of this magazine.

Rappaport indicated that a wholesale move of T-BUG from the vicinity of 4380h to locations starting at 7380h greatly simplifies the logistics involved.

The smallest number of instructional address bytes are to be changed only when the high-order half of the address is to be dealt with.

My TRS-80 was originally a 4K Level I machine. After getting remotely acquainted with BASIC usage, I purchased T-BUG and entered the exciting, fascinating world of machine language programming.

After my excitement died down, I realized that T-BUG lacked some operating features. Thus, this monitor program was cumbersome to use.

The two shortcomings that seemed to detract most from overall satisfaction with T-BUG were its video display approach and inability to move by choice through consecutive memory locations.

Rappaport voiced my thoughts about the address block location in the original T-BUG. I didn't devise any programmed means to move T-BUG to the high end of my then adequate memory, however. I did it the hard way, instead, by keying every byte into high memory using the T-BUG itself. Level I doesn't PEEK and POKE.

A few months afterwards the situation changed. Then came Level II and 16K! Now I can get something done!

Wait a minute. T-BUG is still in the way. So, I laboriously moved it again, this time to the memory block starting at 7380h.

Changes Needed

If you have used T-BUG much, you've probably wished it could do more, or at least do some things differently. One thing that bothered me was the video display format – not the memory address and byte display. The garbage on the rest of the screen bothered me.

Another thing I wanted T-BUG to do was complete erasure of the screen, on command. Another capability I wished the original monitor had was that of displaying bytes at the same time another machine language program was being loaded under command.

One more change I sorely needed was to backstep through memory one byte at a time. Those readers who have typing skill approaching mine can appreciate the value of that last change to T-BUG.

It is aggravating to make a mistake when entering data in the M mode. It is frustrating to have to exit the memory exam mode and re-enter it, at or preceding the address where the wrong data byte was entered – just to correct that one, last entry.

Wouldn't it be nice just to hit the space bar and back up to that last address, correct the data, and then proceed? A simple program change can allow just that.

Original Program

The original T-BUG program provided for erasure and scrolling of the 16 columns on the left side of the video display screen. Anything to the right displayed when T-BUG was brought up, remained on screen, unless a dedicated effort was made to load 20h (ASCII space) into the appropriate video RAM locations. This erased the extraneous material.

I solved the video display garbage problem in two ways. My modified T-BUG High not only scrolls an entire horizontal line at a time, but, on command, it erases the entire screen and displays the prompt symbol at the upper left corner. Using the scrolling technique, then, the garbage was quickly shoved off the screen.

The capability to display bytes on the screen, as a system tape is being loaded by T-BUG, is not of prime importance; however, it is entertaining and useful to know. It allows you to read the file name of the tape, and with a little practice, you can identify the memory address where the first program byte is loaded. You can also see on display the execution address of that program.

Caution

A word of caution is in order. The program changes to be undertaken will, of necessity, modify the flow of events through the original T-BUG program which has been moved to the high memory area. Modifications to T-BUG High, using itself to modify its own program locations, could also result in an immediate crash.

I urge you to follow this sequence: (1) Load T-BUG High in the normal manner. Do not key /ENTER when it is loaded; instead, push RESET and return to BASIC. (2) Enter SYSTEM again and load T-BUG Low. Bring up this program in the normal manner. (3) Enter all pertinent changes to T-BUG High, including program segments above and below the original program locations. (4) Use T-BUG Low to jump to 73AOh, the starting address of T-BUG High. (5) After a thorough check of the modified T-BUG High, use it to punch a tape of itself.

Now a word to those who have relocated T-BUG to some range of addresses other than those starting at 7380h. The modifications detailed here will still produce the desired result, but only if you make the necessary address changes to suit your case.

It will be up to you to locate the bytes in your version of

$ $ $ $

MAKE MONEY

$ $ $$ $

Selling 80 Microcomputing, the only major journal for the users of the TRS-80*, is a sure bet for getting the computer enthusiast into your store. Once through the door you can sell him anything.

$$$$$

We know "80" will make money . . . it's the only magazine for the TRS-80* users and you know how many of those there are. So call today and join the dealers who make money with "80".

$$$$$$$

For information on selling 80 Microcomputing, call 603-924-7296 and speak with Ginnie Boudrieau, our Bulk Sales Manager. Or write to her at 80 Microcomputing, Pine Street, Peterborough, NH 03458.

***TRS-80 is a trademark of the Tandy Corp.**

MARK GORDON COMPUTERS©

DIVISION OF MARK GORDON ASSOCIATES, INC. ✓270
P.O. Box 77, Charlestown, MA 02129 (617) 491-7505

COMPUTERS

Atari 800 W 16K	799.00
4K Model III	599.00
Model II 64K System	3499.00
16K Model III	879.00

DISK DRIVES

40 Track 5¼ inch drive	314.00
80 Track 5¼	544.00
4 Disk Drive Cable	39.00

PRINTERS

Centronics 730	599.00
Epson MX80	Call for price
Epson MX70	Call for price
Centronics 737	849.00
Okidata Microline 83	999.00
Okidata Microline 82	729.00
Integral Data 440G	999.00
NEC 5510 w-tractor	2679.00
Okidata Microline 80	499.00
Diablo 630	2495.00

MISC HARDWARE

Expansion int TRS-80(Ok)	269.00
Novation D-Cat Modem	166.00
16K Memory Kit	41.99
Leedex Monitor	119.00
Leedex 100G	139.00
Leedex Color Monitor	399.00
Printer Cable for above	49.00
ISO-2 Isolator	54.00
AC LINE FILTER	24.00

STORAGE MEDIA

Scotch-box 10-5¼	27.00
Memorex-box 10-5¼	22.00
Plastic Storage Box	5.00

OPERATING SYSTEMS

NEWDOS by APPARAT INC	49.00
NEWDOS+ by APPARAT INC	99.00
MMS FORTH DISKETTE-PRIMER	79.95
NEWDOS 80	149.00

BUSINESS SOFTWARE FOR TRS-80 BY SBSG

Free enhancements and upgrades to registered owners for the cost of media and mailing. 30 day free telephone support. User reference on request.

Fully Interactive Accounting Package. General Ledger, Accounts Payable, Accounts Receivable and Payroll Report Generating

Complete Package (requires 3 or 4 drives)	$475.00
Individual Modules (requires 2 or 3 drives)	$125.00
Inventory II (requires 2 or 3 drives)	$99.00
Mailing List Name & Address II (requires 2 drives)	$129.00
Intelligent Terminal System ST-80 III	$150.00
The Electric Pencil from Michael Shrayer	$150.00
File Management System	$ 49.00

FINE PRINT

TRS-80 is a Tandy Corporation trademark. Use of above operating systems may require the use of Radio Shack TRS-DOS. Radio Shack equipment subject to the will and whim of Radio Shack.

ORDERING INFORMATION

We accept Visa and Mastercharge. We will ship C.O.D., certified check, or money order only. There will be a 40 percent deposit required on all C.O.D. orders over $300.00. Massachusetts residents add 5 percent sales tax.

To order, call toll-free 1-800-343-5206
For information call 617-491-7505

master charge — VISA

The Company cannot be liable for pictorial or typographic inaccuracies. The above prices do not include shipping.

✓See List of Advertisers on page 306

	Change From	To
73E5	FE	C3
73E6	46	80
73E7	CA	78
73E8	0D	00
73E9	78	00
742C	FE	C3
742D	0D	AA
742E	28	78
742F	0E	00
7554	11	00
7555	30	00
755B	10	40
7566	DD	00
7567	19	00
7573	10	40

Table 1. Starting with 73E5; changes to be made to T-BUG High.

T-BUG High to be changed, and decide the proper address locations to be used.

Modifications

Table 1 shows the location at which changes to T-BUG High are to be made. Table 2 includes the bytes to be added at the addresses at the end of the main T-BUG High program. Shown in Table 3 are the bytes to be entered in the block of addresses preceding the start of T-BUG High. The following is a description of the changes, and the logic behind them.

Since commands are being added to T-BUG, it is necessary to make room in the command table for additional function calls. Instead of inserting the additions to the table and shifting the entire remainder of the program upward in memory to make room for changes, I inserted a JUMP instruction at the head of the table.

I had to eliminate a comparison and a conditional JUMP instruction in the original table in order to make room for the inserted instruction. Dislocated table segments appear then, in the command table extension starting at 7880h.

I ran into the relocation problem again when I inserted bytes into other locations in T-BUG High to modify its performance. I thus took a logical (easy) way out. You will note that other changes detailed in Table 1 result from the need for additional program space: jumps are made to new subroutines outside the original program, and those subroutines normally return to the next logical location in the unmodified program.

The program change starting at 742Ch provides a means of including the subroutine starting at 78AAh in the routine that normally increments memory addresses when in the M mode. If the space bar is pressed, the memory address is decremented to the previous location. If data at the indicated memory location is changed, or the enter key is pressed, the memory address is incremented as usual.

The change at 755Bh provides for 64 column scrolling, instead of the 16 column scrolling in the original program.

The changes at 7566h and 7567h are necessary to permit proper operation of the memory backstep subroutine.

Additions

Following are comments on Tables 2 and 3. Note that data bytes are added in two blocks, one on either end of T-BUG High. One block of data is added following the last instruction byte at 7824h. The other data block to be added starts at 7300h and stops a few bytes short of 7380h, the first byte in the unmodified relocated T-BUG.

Readers who are curious about the discrepancy between the normal ending address of T-BUG High (7824h) and the last address reserved for T-BUG use (7980h) need not wonder any more. Portions of this memory area are used for a stack. Other segments and specific locations are used by T-BUG for temporary storage of data in housekeeping operations.

Do not relocate the data in the block starting at 7300h to any area nearer the end of T-BUG unless you have disassembled T-BUG and located all pertinent reserved memory areas.

A command table extension starting at 7880h is called indirectly whenever the prompt (#) symbol appears on the screen. (T-BUG is awaiting a command.)

Note the F command (46h = ASCII F) in this table. Remember that it was dislocated to provide room in the main program for a jump instruction. Also in this extension are hex representations for space, D and E. More on D and E later.

If the space bar is hit when in the command mode, the subroutine at 7897h–78A6h is invoked, completely erasing the screen. A jump is then made to the main program where the prompt is again displayed. T-BUG is once again in the command mode.

The subroutine at 78AAh–78C1h is called during the M mode, and allows the user to step forward or backward in memory.

If the D key is pressed in the command mode, the main program is modified. Incoming bytes from a machine language tape can then be displayed and loaded into memory. The E key restores this aspect of T-BUG High to its original configura-

7880	FE	78A2	01
	46		FF
7882	CA		03
	0D	78A5	ED
	78		B0
7885	FE	78A7	C3
	20		80
7887	CA		73
	97	78AA	FE
	78		0D
788A	FE	78AC	CA
	44		3E
788C	CC		74
	47	78AF	FE
	73		20
788F	FE	78B1	28
	45		03
7891	CC	78B3	C3
	5D		30
	73		74
7894	C3	78B6	DD
	EA		2A
	73		3F
7897	3E		78
	20	78BA	DD
7899	32		2B
	00	78BC	DD
	3C		2B
789C	21	78BE	DD
	00		22
	3C		3F
789F	11		78
	01	78C2	C3
	3C		3E
			74

Table 2. Starting with 7880; bytes added at end of T-BUG High.

7300	C5	7327	23	734D	01
7301	06	7328	23		0A
	08	7329	7C		00
7303	CD	732A	FE	7350	ED
	62		40		B0
	77	732C	20	7352	C9
7306	10		03	7353	CD
	FB	732E	21		00
7308	CD		C0		73
	10		3F	7356	C9
	73	7331	22	7357	00
730B	C1		3D	7358	00
730C	C9		78	7359	00
730D	00	7334	D1	735A	00
730E	00	7335	C1	735B	00
730F	00	7336	F1	735C	00
7310	E5	7337	E1	735D	11
7311	F5	7338	C9		82
7312	C5	7339	E6		77
7313	D5		0F	7360	21
7314	2A	733B	C6		69
	3D		30		73
	78	733D	FE	7363	01
7317	4F		3A		0A
7318	CB	733F	FA		00
	0F		44	7366	ED
731A	CB		73		B0
	0F	7342	C6	7368	C9
731C	CB		07	7369	C5
	0F	7344	77	736A	06
731E	CB	7345	23		08
	0F	7346	C9	736C	CD
7320	CD	7347	11		62
	39		82		77
	73		77	736F	10
7323	79	734A	21		FB
7324	CD		53	7371	C1
	39		73	7372	C9
	73				

Table 3. Starting with 7300; bytes added in front of T-BUG High.

tion—then there is no byte display while loading. Naturally, the monitor must be in command mode for the E key to function.

As shown by inspecting the extension, depression of the D key causes a jump to a subroutine starting at 7347h. This subroutine, from 7347h to 7352h, loads the data bytes from 7353h to 735Ch into the main program starting at 7782h. The result is the rewriting of a segment of the main program.

Now when a system tape is loaded by T-BUG High, the subroutine from 7300h to 730Ch is called periodically. This in turn invokes another subroutine, starting at 7310h, that displays the tape data bytes being loaded.

Depression of the E key calls the subroutine from 735Dh to 7368h. This rewrites into the main program the data bytes residing between 7369h and 7372h. Transfer of this block of bytes back to the main program will restore that segment of T-BUG High to its original configuration.

Operation

Little needs to be said about using the added functions and capabilities, since I'm sure that most of you will explore them as soon as the program has been modified. The following is therefore for the more patient users.

In the command mode, the space bar clears the entire screen. In the M mode, the bar backspaces the current memory address. It has no function in any other mode of operation.

In the command mode, the D key enables the tape data byte display during load operations. Incidentally, depression of the D (for DISPLAY) key results in no visible indication of a program change. It becomes visible during L, of course.

Again, in the command mode, depression of the E(ERASE) key results in no overt indication until the L mode is entered. Of course, no tape byte display will be generated.

You'll note that during a load operation where tape bytes are displayed, the display is not scrolled when the screen is filled. I couldn't get satisfactory scrolling and correct tape loading using my crude programming techniques. I simply used too much time for scrolling and, as a result, the tape loading suffered. So, the scrolling had to go. All is not lost, though.

Data bytes displayed on the bottom line are still useful, even though they appear to be all overwritten. The last bytes loaded from the tape are still on that last line. Look closely for group 78. This is a special termination code that tells the LOAD subroutine that the end of the program material is at hand. Now look at the two bytes to the right of the 78 code. These two denote the execution address (in hex) of the program just loaded.

Now look at the first line on the screen. You will see 55 as the left byte. This is a code group designating a system tape. The next six bytes are the file name in ASCII. If the name is less than six characters, the remaining six will be spaces (20h). The next byte will be 3C, indicating to the loading program that the file is to start. The second and third bytes to the right of the 3c byte will denote the starting hex memory location where the file loading begins.

Use modified T-BUG High to load T-BUG Low and decipher some of the mysterious tape format information you've heard about. Note the execution address of T-BUG Low—43A0h. The execution address of T-BUG High should therefore be 73A0h.

This article was written to share my thoughts with you, in hopes that you'll be inspired to develop and refine program techniques and share them, in turn, with us.

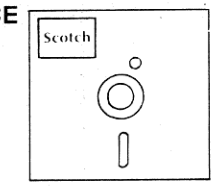
These modifications make T-BUG easier to work with, and help remove the last obstacle preventing some prolific minds from developing new software. We could all benefit. ■

SAVE! SAVE! SAVE!
ON COMPUTER ACCESSORIES FROM NATIONAL TRICOR, INC.

- Call **toll-free** (800) 253-4358
  In Michigan, (616) 375-7519
- We ship within 24 hours
- Name brand, 1st quality products--**25% to 50% off**
- Guaranteed refund or credit within 30 days
- Open and account with us, Visa/Mastercard, check

QUALITY SCOTCH® DISKETTES BY 3M

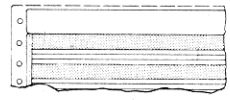
Top brand, top quality. Packed 100 per box.
CALL FOR TODAY'S DISCOUNT PRICE
8" Sigl-Side/Sgl-Density
8" Sgl-Side/Dbl-Density
8" Dbl-Side/Dbl-Density
5¼" Sgl-Side/Sgl-Density
SCOTCH
8" & 5¼" head cleaning kits **$19.95**



REDIFORM CARBONLESS COMPUTER PAPERS

Standard green bar line tint forms in 8½×1" or 14-7/8×11", alternating white/green ½" bars. One part 8×11 (1000 sets per box), list $17.16—**YOU PAY $12.87** or two part (500 per box), list $22.14—**YOU PAY $16.60.**
Call for quote on your size & quantity.

Heavyweight Special Report Form 30# bond paper with alternating green and white ½" bars, ruled lines, and blank header area. 14-7/8×11" (1000 one-part sets per box), list $33.90
—YOU PAY $25.42.



Plain white Word Processing paper 9½×11" (Remove tractor feed margins, it's 8½×11"). 1000 single part forms, list $23.80—**YOU PAY $17.85.**

SAVE ON AVERY LABELS

Self adhesive in two convenient sizes, wide choice of quantity and format. Call for special prices, like our 3½×15/16", one across—1000 labels, list $6.95—**YOU PAY $5.21** or 5000, list $20.85—**YOU PAY $15.64.**

Piggyback labels, with "Peel here" instructions ideal for mailings with send-back feature. 3½×15/16" list $60.90 for 3000—**YOU PAY $45.07.**

Large shipping labels 5×2-15/16" for all required or special address information. 3000 per box, list $64.08—**YOU PAY $48.60.**

Save 25% to 50% every day at National Tricor! Want proof? Send for your catalog and SAVE! SAVE! SAVE! on computer accessories—paper, diskettes, labels, diskette mailers/filers/storage binders, file bars, index tabs, etc . . . plus regular **Telephone Specials** with super-super prices!

National Tricor, Inc.
3335 Greenleaf Blvd.,
Kalamazoo, MI 49008
Toll free (800) 253-4358
In Michigan, (616) 375-7519 ✓142

✓See List of Advertisers on page 306

Run this utility and it will tell you more about your programs than even you know.

Know-It-All

Alan Sehmer
150 A Lorretta Drive NW
Corrales, NM 87048

While going through my September issue of *80 Microcomputing* I came upon William Noel's VARDOC program ("Document those Variables," page 88).

I entered the program, but after a few runs I became uphappy, knowing the first occurrence, last occurrence and number of times a variable is used wasn't enough.

I started out by modifying his program, but by the time I finished the only part of the program that resembled the original was the name.

List Variables and Lines

This program will list all variables, and all lines on which a variable is used. It will also indicate if a variable is an array or not. The program will go on to list all lines pointed to by IF THENs, GOTOs and GOSUBs. It will also list the lines that contain them.

If the program bombs, it will give a rough indication why. And finally, while the program is running, it will show the BASIC line number worked on, the memory address accessed and the number of variables found thus far. The display is mainly for us nail biters who dislike to press enter and watch nothing happen but the cursor disappear.

Now for the other side of the coin, the program is slow. To analyze itself the program took 12 minutes. (The program is 2633 bytes long.)

Worst of all, you must have a 32K machine, and this program loves memory—13072 bytes of it. There are things that can be done, however. The program as listed contains about 540 imbedded blanks that can be deleted. Because the arrays are integer, the line numbers in the program analyzed must not exceed 32766. However, the arrays are probably larger than they need to be. As listed, the program can handle 75 variables, each used in 60 lines, and 100 IF THENs, GOTOs or GOSUBs.

There are four arrays used in pairs of two: A$,A and L,M. The A$,A pair is used to hold the variables and where they are used; the L,M arrays hold the line numbers of GOTOs, etc. and where they point. Since these array dimensions, from time to time, will need to be changed, I have made that easy. At the tail end of line 65020, there are three variables: A2, A3 and A4 followed by a list of which variable affects which array. If during a run of the program, one of the arrays is filled, a SORRY ARRAYS ARE FULL message will be given along with the name of the array filled. Line 65020 can then be edited to change the size of the arrays and, of course, the arrays can all be made smaller to get more free memory.

The program looks into memory to find the start of user memory so that it may be used with BASIC, BASICR and BASIC2. It also adjusts the PEEKs if it must peek into memory over 32767.

To use this program on a disk system, enter and save it with the A option (SAVE "VARDOC2",A). Load the target program, merge VARDOC2 and run 65000.

On a disk system there is a semi-painless way to pick up

```
>PRINT PEEK(16548);PEEK(16549)        <ENTER>
 233  66                              ;Save these numbers
READY
>CLOAD                                ;Load target program
READY
>PRINT PEEK(16633);PEEK(16634)        <ENTER>
 166  69                              ;End pointer plus 2
READY
>POKE 16548,164 : POKE 16549,69       <ENTER>     (166 – 2 = 164)
READY
>CLOAD                                ;Load VARDOC
READY
>POKE 16548,233 : POKE 16549,66       ;Numbers from first PEEK
READY
>
```

In this example 166 – 2 = 164 is easy enough, but if that 166 had been a 1, then what? Then I must borrow from the 69, this would give me a 257 68. Remember, borrowing 1 from the right number adds 256 to the left. And to clean things up 257 – 2 = 255, the first poke would be POKE 16548,255:POKE 16549,68. Nothing to it.

Example 1.

RUN BIG CPM* PROGRAMS ON YOUR MODEL 1 TRS-80*

WITH 39 or 54K of use space.Can use Mixed Drivers 5¼ or 8" (Variable Tracks) Compatable with all **TRS*80** Operating Systems and all **TRS*80** Programs.(usable on 48K disk systems only) Boards fit into keyboard inclosure.

FREEDOM OPTION.....$245
MEMORY EXPANSION OPTION....$295

Send Check or Money Order to:
(MASS. RESIDENTS, PLEASE INCLUDE 5% TAX)

F.E.C. ltd. ✓141
P.O.Box 2368 • Woburn, MA. 01888
(617) 944-5329

BLACKJACK PLAYERS

A YEARS INCOME IN 4 MONTHS.

Basic Strategy Tutors, for the novice & expert alike. Use our Tutors & quickly learn how to become A WINNER. Earn $40 hour. Learn the secrets of our success. Our Tutors will teach you how to:

** BET YOUR MONEY **
** PLAY EACH HAND **
** NOT GET BARRED **
** BE A BUSINESS **

**** BEWARE ****

Our Tutors are not games!!! They are serious tools to make winners out of you. The authors have spent 7 years playing & being winners. Now so can you, with the aid of our Tutors. Our Tutors are based on the strategies developed by Lawrence Revere. More advanced strategies are available call for info. Consultation is available for you by mail or phone. From 12pm - 12am M.S.T.

PKG. 1 contains 10 Basic Tutors for Atlantic City, or Neveda Rush $25 for 16K Mod I or Mod III, cass. $30 for 32K disk Please add $2.00 for shipping.

✓205

MICRO BLAJAK SYSTEMS INC.
2800 NORTH ELLEN STREET
FLAGSTAFF, ARIZONA 86001
(602) 774-5723 or (602) 774-7561

— Professional —

Real Estate Software

For Apple or TRS-80

Property Management System

(32K, 1 Disk Systems)

Features:

- Tenant Information
- Late Rent Reports
- YTD & Monthly Income
- Handles — Partial Payments, Returned Checks, Advance Payments
- Prints Receipts
- 5 Digit Expense Accounts
- Building Expense Report
- Vendor Expense Report
- Income Tax Report
- All Reports Can Be Printed
- Complete Documentation
- Easy Data Entry & Edit
- 200 Units per File

Price $225.00

Real Estate Analysis Modules:

(Cassette or Disk)

1) Home Purchase Analysis
2) Tax Deferred Exchange
3) Construction Cost/Profit
4) Income Property Cashflow
5) APR Loan Analysis
6) Property Sales Analysis
7) Loan Amortization

$35 Per Module

Software Realty Company™

At Computer Stores Everywhere
Or Order COD Direct
(Cal Residents Add 6% Sales Tax)
(213) 372-9419

Dept. M 1116 "F" 8th St., Manhattan Beach CA 90266

DISASSEMBLED HANDBOOK FOR TRS-80

VOLUME 3—$18. POSTPAID

Chapter 1: Writing Disassembler Programs
Chapter 2: High Speed Disassemblers
Chapter 3: Spooling Theory & Practice
Chapter 4: Port Encoders & Decoders
Chapter 5: Writing Interrupt Programs
Chapter 6: D/A Converters & Construction
Chapter 7: A/D Converters & Construction
Chapter 8: High Speed Morse Code Program
Chapter 9: Comm. Bulletin Board Systems
Chapter 10: Radio Teletype From A to Z
Chapter 11: Self-Programmed Learning Q/A
Appendix A: Volumes 1-2-3 combined index
Appendix B: Vols. 1-2-3 Pgms. on Disk $30

VOLUME 1—$10. POSTPAID

6th printing

VOLUME 2—$15. POSTPAID

4th printing

—GERMAN & FRENCH LANGUAGE EDITIONS—

RICHCRAFT ENGINEERING LTD.
Drawer 1065, Wahmeda Industrial Park
Chautauqua, New York 14722
phone (716) 753-2654 for COD orders
(US funds: add $4.50 overseas airmail) ✓276

LEARNING TOOLS

- Spelling Primer
- Vocabulary Builder
- Crossword Generator

EACH PROGRAM FEATURES:

- HUNDREDS OF WORDS
- GRAPHIC SCORING MONITOR
- PROGRAMMABLE SPEED CONTROL

Each Program Available in 4 Levels:

Grades 1-2; 3-4; 5-6; 7-8.
(Specify Grade)

16K - LEVEL II

$ 6.95 each — any two for $ 9.95

DYNATEK INFO. SYSTEMS
586 CONCORD AVE.
WILLISTON PARK, N.Y. 11596

✓253 *"Quality Software at Affordable Prices"*

STEPWISE

MULTIPLE LINEAR REGRESSION

Fast Compiled Machine Language
Comprehensive Data Base Manager
* Transformations
* Lags
Designate Any Variable As Dependent At Run Time
Descriptive Statistics
Correlation Matrix
ANOVA Table
Partial Correlation Coefficients Each Step
Future Releases Are Upward Compatible And Include: Factor Analysis, Time Series, Linear Programming
For 2 Disk, 48K TRS-80®, With Line Printer
Write For Information On Other System Configurations
Price $89.00 — Documentation Only $10.00
Visa And Master Charge Accepted

Barstrann Corporation — Dept. A ✓201
P.O. Box 265 Mid City Station
Dayton, Ohio 45402

STOCKMARKET INVESTMENTS MADE EASIER

Fulfill your dream to invest in the stockmarket.
Invest as little as $1000, or as little as $100 per month.
The potential is there to double that investment within 12, 24, or 36 months. The stock selection and the buy/sell decisions are the key.
We have the financial management computer programs for you.
Through the use of your TRS-80* Level II home computer and the **COMPUVEST** programs, you can determine the stocks in which to invest and when to buy and sell.
The Graham/Rea stock selection criteria program-10 criteria for a stock buy decision----------**$10.00**
COMPUVEST Lump Sum Investment Program—Lump sum investment approach for the small stock investor ----------**$12.50**
COMPUVEST Monthly Investment Program—Monthly investment approach for the small stock investor---**$12.50**
All Three Programs----------**$30.00**
For information or to order cassette tape programs write:

COMPUVEST, INC.
6725 Fishburg Road
Dayton, Ohio 45424 ✓498

*A Registered Trademark of Radio Shack.

DISTRIBUTORS OF QUALITY COMPUTER SUPPLIES

COMPUTER FORMS

S U P P L I E S

Distributor of Computer Paper Products

VISA — master charge — Check or Money Order

Box 1000 sheets 9½"x 11" (sheet size 8½"x 11") tractor feed #15 lb. economy computer paper..$11.95 + $2 shipping

Box 750 sheets 9½"x 11" (sheet size 8½"x 11") tractor feed #20 lb. economy #2 Bond computer paper . . . .$11.95 + $2 shipping

Box 750 sheets 9½"x 11" (sheet size 8½"x 11") tractor feed #20 lb. High Quality #1 Bond with Watermark computer paper. . .$14.95 + $2 shipping

Box 1000 15/16"x 3½" 2 across tractor feed 8"carrier address labels. . .$8.95 + $1.50 shipping (One across available, specify which)

Box 700 6"x 4" continuous postcard stock tractor feed Blank white, yellow, green (specify)...$13.95 + $2 shipping

Box 300 sets (900 sheets) 9½"x 11" (sheet size 8½"x 11") 3 part carbon copy style tractor feed paper . . . .$13.95 + $2 shipping (2 part also available . . .400 sets . . .$13.95 + $2 shipping)

Catalog available check(✓) reader service number

✓240 **Computer Forms • (616) 429-7922**
5588 Caribou, Stevensville, MI 49127

LISP

INTERPRETER FOR THE TRS-80*

SEE THE AUGUST, '79 ISSUE OF BYTE TO FIND HOW EASY IT IS TO USE LISP.

- INCLUDES MORE THAN 30 FUNCTIONS & PREDICATES.
- CODED FOR HIGH-SPEED OPERATION.
- FULL ARITHMETIC CAPABILITY.
- USER'S MANUAL.
- SUPPLIED ON CASSETTE FOR 16K-64K LEVEL II.

SEND $50 IN CHECK OR MONEY ORDER TO:

✓259

CYBER INNOVATIONS
WORLD TRADE CENTER
P. O. BOX 58657
DALLAS, TEXAS 75258

*TRADEMARK OF TANDY CORPORATION

✓See List of Advertisers on page 306

STEREO HI-FI OWNERS
MUSIC COLLECTORS
RADIO PROGRAM MANAGERS

CUSTOM STORAGE AND RETRIEVAL SYSTEM

Now you can have instant access to any record or tape in your music collection with your TRS-80 MODEL I or III.

RECORD AND TAPE COLLECTION INVENTORY will store your collection on tape or disk. You will then be able to search for any record or group of records and list to the display or a printer. The collection can be sorted (alphabetically) for display, printing and storage. File editing allows quick and easy addition or deletion of records, and adding to or changing any individual record description. Complete error-trapping makes program crashes almost impossible.

The 16K TAPE version will conveniently handle up to 350 records and tapes per data file. An unlimited number of data files can be stored on tape. PRICE: $15.00

The enhanced 32K and 48K DISK versions are upgraded for heavy commercial use and can handle up to 500 and 1000 records per data file, respectively. Up to 1500 records can be stored on a one-drive system. Any number of drives can be used, allowing instant access to thousands of records. An unlimited number of data files can be stored on diskettes, allowing even a one-drive system convenient access to thousands of records. Many other improvements over the tape version. PRICE: $25.00

Programs provided on cassette; easily transferred to disk. Complete user's manual with examples.

Also Available for MODEL I/III

8-PAK OF BEST HITS

HORSE RACE - Winner buys the drinks. SCRAMBLE - Word jumble. LABYRINTH - New maze every play. ONE-WORD ANSWERS - Quiz with clues. MATCH - Visual concentration. LASER BEAMS, UFO INVADERS, AIR RAID - 3 high-speed action games. PRICE: $15.00 (4K)

BIORHYTHM CHARTS

Know when it's best to relax, party, or interview for that new job. Plan happenings for your "peak" days. Printed charts make a unique gift, too. Print chart to display or printer, including Quick Printer II. Useful and fun. PRICE: $10.00 (16K)

THE BIG BOARD - a stock market game

Risk and world events affect stock prices. The computer broker tracks players' funds, portfolio, margin account, net worth, rate of return, splits, margin calls, and more. Hours of fun (and practice!). PRICE: $15.00 (16K)

Mailed First Class, include $1.00 S&H.
(Arkansas orders add 3% sales tax.)
Overseas Orders, include $4.00 S&H.

Order from:

OZARK MOUNTAIN SOFTWARE ✓308

FRANK L. WHITSELL, P.O. Box 2945, Fayetteville, Arkansas 72701 Ph. (501) 521-2801

FULL SCREEN TEXT EDITORS FOR THE TRS-80*

Now there are products that will allow you to program like the professionals do. If you enjoy the sophistication of writing your own programs then you are in for a real treat when you use our editors. Features include: full screen display; complete control over scrolling and cursor movement; character change, insert, delete; insert, delete, copy, move lines or blocks of lines; renumber; global find and change.

BASIC editor runs from tape or disk. Once loaded, a single command invokes our extended edit mode, with powers and abilities far beyond those of conventional editing! Advanced features include user definable macro keys and the powerful program restructuring tool SELECTIVE RENUMBER.

EDTASM editors are compatible with EDTASM source tape files. Disk version includes patch to run Radio Shack* EDTASM from disk! All products are shipped on tape for level 2 machines and include a comprehensive owner's manual.

The Text Editor for BASIC Order #1010-20 . . . . . **24.95**

The Text Editors for EDTASM Source Files:
Tape Version Order #1010-30 . . . . . **24.95**

Disk Version (Req. 32K and up) Order #1010-31 . **34.95**

New: XBUG self-relocating debugging tool with multi-speed single step facility.
Order #1020-10 . . . . . **$19.95**

Send check or money order (no CODs) to:
If ordering by credit card, please include all information on credit card.

MasterCard VISA

CAU™ COMPUTER APPLICATIONS UNLIMITED™ ✓107
Post Office Box 214, Dept. 181 Rye, New York 10580

N.Y. State residents please add applicable sales tax. Please allow 4-6 weeks delivery. Dealer inquiries invited.
Radio Shack and TRS-80 are registered trademarks of The Tandy Corp.

Welcome to . . .

THE RACES

THEY'RE OFF!

Eight horses surge down the track, straining for the lead, with your horse struggling in the pack.

They round the turn and head into the stretch. Your horse shoots from behind, catching the lead horse. They cross the finish line.

The Win, Place, and Show horse results are printed on the screen, along with each bettor's race winnings and total daily winnings.

You collect your winnings and decide if you want just to watch, or bet on the next race. You study the odds, place your bets, and select the track speed—fast (dry), average, or slow (wet).

The horses are at the starting gate, jumping and snorting. You raise the gate, and the next race is underway.

Each horse gallops forward randomly. Spectators squirm and shout as they urge their horses to win.

You have all the track action and thrills. Plenty of winners—and losers! Now you can use your computer to find out what it takes to win at the track. Good Luck!

Requires 16K
Tape—$9.95
Disk—$14.95

Send check, or charge it to Visa or MC. (Print charge number and expiration date—Phone 313-627-2877 for charge if you wish)

WE GIVE IMMEDIATE SERVICE!

ECHO PRODUCTS INC., 335 MILL, ORTONVILLE, MICH. 48462 ✓197
Dealer Inquires Invited

TRS-80™ OWNERS!

Prepare Tax Returns for friends and relatives!

New easy to use Tax Program developed by J. D. Gramm

This 1040 Program (Individual Income Tax Return) has the following features

1. Adds and enters all information on W-2 forms
2. Computes and enters excess FICA
3. Computes tax
4. Automatically prepares information for TC
5. Automatically computes and enters Earned Income Credit
6. Prepares Itemized Deductions
7. Prepares Income Averaging
8. Prints Form 1040
9. Tax information and back up from J. D. Gramm
10. Tractor feed forms and schedules included in price

Equipment Needed Model 1, 2 or 3, 48K 1 disc Printer optional

Price 159.95 ✓481

J.D. GRAMM

Phone: (305) 822-7341
6846 NW 169 St., Miami, Fla. 33015

BUSINESS USERS!

SAVE TIME & MONEY BY CONTROLLING YOUR LONG DISTANCE TELEPHONE COSTS

LONG DISTANCE ANALYZER will

- Sort your billed calls
- Identify each party called (from your known list) or print locations of unrecognized numbers
- Total the cost of calls to each number, to all numbers, and to all unrecognized numbers
- Analyze calls and tolls by area code, state, and WATS zone
- Print an alphabetical directory of recognized numbers
- Save verification time
- Create cost-consciousness
- Facilitate cost accounting and client billing
- Isolate personal calls and billing errors
- Reveal inefficient use patterns
- Help you perform WATS feasibility studies

Requires Model I, II, or III TRS-80*, Level II, 16K, and 1 disk. Printer is optional. No connection to phone system.

Model	Cassette	TRSDOS* disk
I	$95	$135
II	N/A	$155
III	$95	$135

Brochure on request.
Send model number and check or money order to:

Golden Braid Software
P.O. Box 2934 ✓281
Sarasota, Florida 33578

*TRS-80 and TRSDOS are trademarks of Tandy Corporation.

QUALITY SOFTWARE for the TRS-80™ MICROCOMPUTER

KEYWORD Indexing System

A series of programs that will create a data file on disc, build an index of all occurrences of "Keywords" in the text of the data file and allow inquiries or searches into the file using the indexed keywords. The system features:

- **flexible record lengths with location printers**
- **deletion of non keywords from index by system**
- **"and" "or" "not" logic for inquries**
- **interface for user written inquiries**

KEYWORD INDEX—2 disk 32K system $49.95
1 disk 32K system $39.95

SORTS for HOME and BUSINESS

No computer user should be without a versatile, easy to use sort program. The Northeast Microware in memory sort programs are written in Level II BASIC and have the following features:

- **Sort ALPHA or NUMERIC data**
- **Sort on up to 5 fields simultaneously**
- **In ascending or descending sequence**
- **Supports kb. video or tape I/O**
- **Supports seq. disk and printer I/O (SORT IID)**
- **Supports user I/O routines**
- **User exits (SORT IID only)**

SORT II—16K Level in memory sort $19.95
SORT IID—32K DOS in memory sort $29.95

FOR the SERIOUS GAMBLER

BLACKJACK SIMULATOR. Allows you to simulate the playing of thousands of hands of BJ and analyze the results on tape in Level II BASIC. $19.95

Manual for all programs available for $3.00 ea. (price deductible on purchase of program)

"TRS-80 is a registered trademark of TANDY CORP."

Northeast MICROWARE
BOX 2133, ✓74
BOSTON, MA. 02106

10K bytes more memory, run under BASIC2 instead of Disk BASIC. Load and merge the programs as shown, then give a CMD"T and CSAVE to tape. Go back to DOS and boot up under BASIC2, CLOAD, then run 65000.

But what if I don't have a disk? Follow these instructions:

Type in VARDOC2 and CSAVE it to tape.

CLOAD the target program.

PEEK locations 16548, 16549 and write them down.

PEEK locations 16633 and 16634. This is the end of program pointer, plus two. Two must be subtracted from the left hand number, if the number is one or zero. 256 can be borrowed from the right hand number. Example 1 should make all this clear.

POKE the calculated number into locations 16548 and 16549. BASIC will now load the next program behind the first program.

CLOAD VARDOC2. If a listing is made now, the target program will seem to be lost. This is a good time to make sure the VARDOC2 program got loaded correctly. If not, CLOAD it again.

POKE locations 16548 and 16549 with the numbers from the first PEEK. Now list the program to make sure both programs made it through all this.

If all goes well, a listing should show the target program followed by the VARDOC2 program. ■

Program Listing 1. Variable Documentation Program

```
65000 '
65005 '---------- VARIABLE DOCUMENTATION PROGRAM ------
      -------
65010 ' LOAD TARGET PROGRAM, MERGE THIS PROGRAM THEN RU
      N 65000
65015 CLEAR 200 : DEFINT A,L,M : CLS : INPUT"DO YOU WIS
      H HARD COPY (Y/N)";A$ : IF A$="Y" THEN P=1 ELSE P=
      0
65020 INPUT"NAME OF TARGET PROGRAM";A$ : CLS : PRINT "V
      ARIABLES AND REFERENCES FOR '";A$;"'" : A2=75 : A3
      =60 : A4=100 'A$   -A2 A-A3 M&L-A4
65025 IF P=1 LPRINT"VARIABLES AND REFERENCES FOR '";A$;
      "'" : LPRINT CHR$(138)
65030 DIM A(A2+2,A3),A$(A2+2),L(A4+2),M(A4+2) : A1=0 :
      A$(1)="[" : M(1)=32767 : M1=0 : SW=1 : U=PEEK(1654
      8)+PEEK(16549)*256 : GOTO 65045
65035 IF U>32767 THEN F=-1*(U-65535) ELSE F=U
65040 T=PEEK(F) : U=U+1 : PRINT@ 128,"MEMORY ADDRESS ="
      ;U;"      "; : RETURN
65045 GOSUB 65035 : D=T : GOSUB 65035 : D=T*256+D : GOS
      UB 65035 : E=T : GOSUB 65035 : E=T*256+E : IF E>32
      766 THEN 65155 ELSE PRINT@ 64,"WORKING ON LINE #";
      E;
65050 GOSUB 65035 : IF T=32 THEN 65050
65055 IF T=0 OR T=147 OR T=251 THEN U=D : GOTO 65045
65060 IF T=34 THEN SW=-SW
65065 IF SW<0 GOSUB 65035 : GOTO 65060
65070 IF T=141 OR T=145 OR T=202 THEN C$="" : GOTO 6513
      0
65075 IF T<65 OR T>90 THEN 65050 ELSE C$=""
65080 IF (T>47 AND T<58) OR (T>64 AND T<91) OR T=33 OR
      T=35 OR T=36 OR T=37 THEN C$=C$+CHR$(T) : GOSUB 65
      035 : GOTO 65080
65085 IF T=40 THEN C$=C$+"(*)"
65090 U=U-1 : A1=A1+1 : IF A1>A2 THEN A$="A$" : GOTO 65
      210
65095 FOR J=1 TO A1 : IF C$=A$(J) THEN 65115 ELSE IF C$
      >A$(J) THEN 65125
65100 PRINT@ 256,"SORTING ARRAYS"; : FOR R=A1+1 TO J ST
      EP-1 : A$(R+1)=A$(R) : NEXT : A$(J)=C$
65105 FOR R=A1+1 TO J STEP-1 : FOR S=0 TO A3 : A(R+1,S)
      =A(R,S) : NEXT
65110 NEXT : A(J,0)=E : FOR R=1 TO A3 : A(J,R)=0 : NEXT
       : PRINT@ 256,"                "; : J=100 : GOTO 651
      25
65115 FOR R=0 TO A3 : IF A(J,R)=0 OR A(J,R)=E THEN A(J,
      R)=E : R=A3+10 : J=A2+2
65120 NEXT : A1=A1-1 : IF R<>A3+11 THEN A$="A" : GOTO 6
      5210
65125 NEXT : PRINT@ 192,"NUMBER OF VARIABLES SO FAR =";
      A1; : GOTO 65050
65130 GOSUB 65035 : IF T=32 THEN 65130 ELSE IF T<48 OR
      T>57 THEN RE=VAL(C$) : U=U-1 : GOTO 65140
65135 C$=C$+CHR$(T) : GOTO 65130
65140 M1=M1+1 : IF M1>A4 THEN A$="L&M" : GOTO 65210 ELS
      E IF C$="" THEN M1=M1-1 : GOTO 65050
65145 FOR J=1 TO M1 : IF RE<=M(J) AND RE>M(J-1) THEN FO
      R Q=M1+1 TO J STEP-1 : M(Q+1)=M(Q) : L(Q+1)=L(Q) :
       NEXT : M(J)=RE : L(J)=E : J=A4
65150 NEXT : GOTO 65050
65155 CLS : PRINT"VAR","USED IN LINES" : IF P=1 LPRINT"
      VAR","USED IN LINES"
65160 FOR R=1 TO A1 : LE=0 : PRINT" ";A$(R), : IF P=1 L
      PRINT " ";A$(R),
65165 FOR S=0 TO A3 : IF A(R,S)=0 THEN S=A3 : PRINT : I
      F P<>1 THEN 65175 ELSE LPRINT CHR$(13) : GOTO 6517
      5
65170 GOSUB 65215 : PRINT A(R,S); : IF P=1 GOSUB 65220
      : LPRINT A(R,S);
65175 NEXT : NEXT : PRINT : IF P=1 LPRINT CHR$(138)
65180 PRINT"LINE #","REFERENCED BY"; : IF P=1 LPRINT"LI
      NE #","REFERENCED BY"
65185 FOR R=1 TO M1 : LE=0 : IF M(R)<>M(R-1) PRINT : IF
       P=1 LPRINT CHR$(13)
65190 IF M(R)=32767 PRINT "NONE" : END
65195 IF M(R)<>M(R-1) PRINT M(R), : IF P=1 LPRINT M(R),

65200 IF L(R)<>L(R-1) OR M(R)<>M(R-1) GOSUB 65215 : PRI
      NT L(R); : IF P=1 THEN LE=LE+LEN(STR$(L(R))) : IF
      LE>45 THEN LE=0 : LPRINT CHR$(13);"", : LPRINT L(R
      ); ELSE LPRINT L(R);
65205 NEXT : END
65210 PRINT@ 384,"SORRY ARRAY '";A$;"' IS FULL" : END
65215 PP=PEEK(16416)+PEEK(16417)*256 : IF PP-15359-INT(
      (PP-15359)/64)*64>57 THEN PRINT : PRINT, : RETURN
      ELSE RETURN
65220 LE=LE+LEN(STR$(A(R,S))) : IF LE>45 THEN LE=0 : LP
      RINT CHR$(13);"", : RETURN ELSE RETURN
```

65000-65030	House keeping
65035-65040	Peek subroutine
65045-65050	Get BASIC line number and memory address of start of next BASIC line.
65055-65065	Do I have an end of line, remark or quotes?
65070	Do I have a IF THEN, GOTO or GOSUB?
65075	Do I have a letter?
65080-65090	If letter build variable string A$.
65095-65125	Insert string A$ and line number into array sort if necessary.
65130-65135	Assemble line number after GOTOs etc.
65140-65150	Insert line numbers into arrays L&M.
65155-65175	Print variables and line numbers.
65180-65205	Print references for GOTOs etc.
65210-65220	Subroutine to get neat display.

Program Breakdown

!!NOW AVAILABLE!!

INDEX SEQUENTIAL ACCESS METHOD

★ Get and Put Records to Disk File by "KEY"
★ Read File in Key Sequence Without Sorting
★ Delete Records Without Recopying File
★ Add Records to Disk Files in Any Sequence
★ Variable Key Length From 1 to 50 Characters
★ Machine Language or Basic Subroutines.

BUSINESS APPLICATION ADVANTAGES

- Improved Disk Utilization
- Easier Program Development
- Improved Operating Characteristics
- Reduce or Eliminate Sorting
- Improved Performance

ISAM SUBROUTINES
ISAM UTILITIES

Documentation
On Diskette $90.00

– PLUS – Free Mailing List Sample Application
Add 6% Sales Tax for California Orders

TRS-80 **MODEL I, II, & III** SOFTWARE FROM:

Johnson Associates - or - Telephone Order Line
P.O. Box 1402M ✓85 For Bank Card Sales
Redding, CA 96001 (916) 221-0740

WRITE FOR FREE CATALOG

✓See List of Advertisers on page 306

A mean program.

On the Average

Len Gorney
Box 91 RD 5
Clarks Summit, PA 18411

What does the word *average* mean? The arithmetic mean is not the only way by which average values can be expressed. The following tutorial concerns different ways an average value may be expressed,and includes a Program Listing, which will calculate these values with a TRS-80 Level II. Throw away your calculator, load the program, and enter the average world.

The Mean

The arithmetic mean is the method most often used to calculate the average value of a list of numbers. The following numbers represent temperature readings taken over one week: 54.0, 38.0, 36.5, 39.5, 31.5, 31.5, 10.5. Add these values to obtain the sum 241.5 and divide by 7, the number of readings. The quotient, 34.5, becomes the arithmetic mean. This is the method of determining the average most often meant when we see the word average in print. What it tells us is that, given our list of numbers, the value 34.5 would act as the balance point of the list.

The Median

Another value which can describe the average of our list of numbers is called the median, which gives us the middle value. If we sort the list into ascending order, we can easily pick out the number in the center of the list. In our example, 36.5 is the value at the center of sorted numbers! 10.5, 31.5, 31.5, 36.5, 38.0, 39.5, 54.0. The median is the number which has 50 percent of the numbers above it and 50 percent below it.

Since our list contained an odd amount of numbers, it was easy to pick out the middle value. However, when an even amount of numbers are in the list, there is no middle value to choose by counting: there are two middle values. It is necessary to take these middle values and calculate their arithmetic mean. Let us take the following list: 10.5, 31.5, 31.5, 36.5, 38.0, 39.5, 54.0, and 55.0. The middle values, 36.5 and 38.0, are added and the sum, 74.5, is divided by two, in order to arrive at the arithmetic mean of these two values: 37.25.

The Midrange

The midrange value is another measure of the average value of a number list. Take the arithmetic mean of the largest and the smallest values in the list. In our example, the largest number is 54.0 and the smallest is 10.5, which, when added, gives us the sum of 64.5. Dividing by two gives us a quotient of 32.25, the midrange of our list. Similar averages can be calculated for the midrange by disregarding the largest and the smallest values in the original list, and taking the arithmetic mean of the next largest and the next smallest. This method is used to score athletic events to smooth out biases introduced by the judges. If the amount of

```
1000 REM  AVERAGES
        LEN GORNEY, BOX 91 R.D. 5, CLARKS SSUMMIT PA
1010 DEFINT B, J, L, N, T:
     DEFSNG H, V:
     DIM V(1000), VM(1000)
1020 CLS:
     INPUT"ENTER NUMBER OF ITEMS IN SAMPLE ";N
1030 CLS:
     PRINT,"ENTER ITEMS"
1040 FOR J = 1 TO N:
       PRINT"ITEM ";J;:
       INPUT V(J):
     NEXT J
1050 CLS:
     PRINT"SORTING ITEMS NOW . . ."
1060 REM  BUBBLE SORT
1070 FOR J = 1 TO N-1
1080   B = N
1090   IF V(B) < V(B-1) THEN H = V(B):
                              V(B) = V(B-1):
                              V(B-1) = H
1100   B = B - 1:
       IF B > J THEN 1090
1110 NEXT J
1120 CLS:
     PRINT"    MEAN = ";:
     M = 0
1130 FOR J = 1 TO N:
       M = M + V(J):
     NEXT J:
     M = M / N
1140 PRINT,M
1150 PRINT"  MEDIAN = ";:
     IF (INT(N/2)*2) = N THEN M = (V(N/2)+V((N/2)+1))/2
                         ELSE M = V((N/2)+1)
1160 PRINT,M
1170 PRINT"MIDRANGE = ";:
     M = (V(N)+V(1))/2
1180 PRINT,M
1190 PRINT"    MODE = ";:
     FOR J = 1 TO N:
       VM(J) = 1:
     NEXT J
1200 JJ = 1
1210 FOR J = 1 TO N-1:
       IF V(J) = V(J+1) THEN VM(JJ) = VM(JJ) + 1
                        ELSE JJ = J + 1
1220 NEXT J
1230 M = 1
1240 FOR J = 1 TO N
1250   IF VM(J) = 1 THEN 1260
                    ELSE IF M > VM(J) THEN 1260
                                      ELSE M = VM(J)
1260 NEXT J
1270 IF M = 1 THEN PRINT"VALUE DOES NOT OCCUR": GOTO 1310
1280 FOR J = 1 TO N
1290  IF VM(J) = M THEN PRINT,V(J)
1300 NEXT J
1310 END
```

Program Listing 1

items in a list is large enough, the values should not fluctuate as widely as in a list which has few values.

The Mode

Our last average value is called the mode. This value tells us what value occurs most often in the list.

Although this average value is not as useful as the mean and median values, the mode does illustrate any bunching about an individual value in a list of numbers. To discover the mode of a list of numbers, find the value which appears most often. For example, the modal value of our list of numbers is 31.5, which appears twice in our list. When more than one modal value appears in a list, it is said to be bimodal or trimodal or n-modal, depending on how many modal values appear.

In addition to the usual description of an average, we have the median, midrange, and mode. Each value represents a different method of calculating a value. The value you choose depends on what message you want to convey about the list of numbers.

The Average Program

The program listed in this article can be used by a TRS-80 Level II system user who wants to find values for the different types of averages. In addition to values for mean, median, midrange and mode, the program will sort the input list of numbers into ascending order. This is necessary to save programming steps when the midrange and median values are calculated.

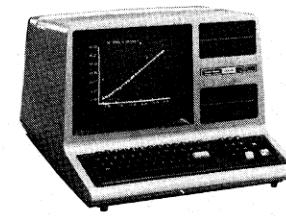
Input is simply the number of items in your list and the values in it. The program quickly calculates the mean value, then sorts the list into ascending order. Depending on how many items you input, the program may take awhile to output the median value. Midrange and mode will be output to the screen. To input another list, simply type RUN after the READY is displayed. ■

AUTHORIZED TRS 80® DEALER #R491

$670.00 MOD... NOT AVAILABLE 16K ... Keypad 26 - 1056

$3500.00 MODEL II
MODEL II, 64K
26 - 4002

$855.00 MODEL III
MODEL III 16K RAM,
MODEL III BASIC
26 - 1062



WE ACCEPT CHECK, MONEY ORDER, OR PHONE ORDERS WITH VISA OR MASTER CHARGE. SHIPPING COSTS WILL BE ADDED TO CHARGE ORDERS. DISK DRIVES, PRINTERS, PERIPHERALS, AND SOFTWARE - YOU NAME, WE'VE GOT IT. WRITE OR CALL FOR OUR COMPLETE PRICE LIST.

FULL FACTORY WARRANTY ON ALL ITEMS SOLD.

C & S ELECTRONICS, LTD. 32 EAST MAIN ST. MILAN, MICH. 48160
✓145 (313) 439-1508 (313) 439-1400

C & S ELECTRONICS MART IS AN AUTHORIZED TRS 80® SALES CENTER STORE #R491

MISOSYS SERIOUS SOFTWARE

EDAS

EDAS is a sophisticated Editor and Assembler for the '80 Model I or Model III. All commands and SOURCE text can be entered in upper or lower case. Direct assembly for memory or multiple disk files by means of *GET assembler directives provides the capability of assembling huge source files with 30,000 bytes of symbol table. Direct assembly to disk or memory for faster debugging operations. DOS functions DIR, KILL, and LIST are available from within EDAS. The Editor provides block move & global change with BASIC syntax editing. EDAS provides power with ease of use. $79 + $S&H.

DUTIL

DUTIL is a utility to examine, clear, initialize, move, and modify data in memory. Load, punch, verify SYSTEM tapes. Disk sector I/O. More! $20.

CMDFILE

Now you can append two or more CMD files and/or SYSTEM tapes. Perform transfer to & from disk/tape of SYSTEM/CMD modules with offset capabilities. $20.

LDOS is the latest generation of sophisticated operating systems for the TRS-80 computers. LDOS is completely documented in a 252-page reference manual. Total support is provided from some of the most knowledgeable people in the industry. You owe it to yourself to investigate this system. Call or write for details. LDOS is priced at $149 plus $4 S&H.

LDOS 5.0

DSMBLR

Complement your assembly language tools with this Z-80 disassembler which produces screen, printer, cassette, or disk file output. A two pass process provides SYMBOLS for 16-bit address and 8-bit relative references. EQUates & ORG are generated. Read SYSTEM programs & display load address range. $20 (DSMBLR I for non-disk use is $15)

EDAS, CMDFILE, DSMBLR Specify Mod I or III. Add $1 S&H + $.50 per program. VA residents add 4%.

MISOSYS - Dept. MU2 ✓221
5904 Edgehill Drive
Alexandria, Virginia 22303
703-960-2998 MicroNET 70140,310
Dealers Inquiry Invited

master charge VISA

DISKMOD

Turn your Editor Assembler into a disk package. This 32K patch modifies EDTASM for DOS operation. Features? Add full disk I/O, block move, global change, printer pagination, sorted symbol table, print memory utilization, enhance DEFM expansion, protect memory, and recover after BOOT. From within the EDTASM you will have DIR, KILL, & FREE. Upgrade your EDTASM! $20.

THE BØØK

THE BOOKs must be a part of your tools. Volume I gives you access to all math operations in your Level II ROM. A symbol table of the entire machine noting over 500 addresses is included. Volume II tells you everything you wanted to know about the Level II I/O—printer, keyboard, video, and cassette routines are fully explained. Each volume has a fully commented listing of all the routines discussed. THE BOOKs will save you hours of assembler programming. Each volume is priced at $14.95 or buy both for $24.95. Add $1.50 S&H per book.

✓See List of Advertisers on page 306

A game of serpentine strategy in offense and defense.

BOA

Jeff Myers
210 Park Ave.
Hillsboro, OH 45133

Boa, a graphics game, evolved from my early experiments with simulated motion by sequentially setting and resetting pixels (the smallest graphics character).

I combined this with what I'd learned about the keyboard's memory to check inputs.

Boa is a game for two and its goal is simple: to survive longer than your opponent. The two of you manipulate sets of four keys each (2, Q, W, A or I, J, K, M) in order to control your Boa "snakes" which grow and grow.

The first player to run into a wall or either snake, loses. The winner is indicated by an asterisk on the scoreboard.

Although it's simple, Boa offers the constant interplay of offense and defense that is characteristic of many good games, along with a chance to use a variety of game strategies.

You can also play Boa alone. For this solitaire version I added an indicator to show the percent fullness of the screen at the game's end. The challenge is to operate both snakes at once, striving for the highest percentage score.

In earlier versions I used single pixels rather than two pixel squares as fundamental units. In those, the horizontal movement is slower than the vertical movement, which adds an interesting facet to the game. Boa can easily be converted by altering the lines containing SET and RESET pairs. ■

```
0 '   *******  BOA  *******
1 '   BY JEFF MYERS    210 PARK AVE    HILLSBORO OH 451
     33
5 CLEAR1000:DEFINTA-Z:PO=26:CZ=0:CP=1:CN=-1:KT=15010:KN
     =15009:KF=15004:K0=15360:GOSUB9000
10 GOSUB900:GOSUB8000:GOSUB950:P=2*P0+6:Q=3*Q0+4:SET(P,
     Q):SET(P+CP,Q):R=2*R0-CP:S=3*S0+4:SET(R,S):SET(R-C
     P,S):C=2
12 P1=CP:Q1=CZ:R1=CN:S1=CZ
100 'A INPUT
120 IFPEEK(KF)AND4THENQ1=CN:P1=CZ:GOTO200
130 IFPEEK(KF)AND2THENP1=CN:Q1=CZ:GOTO200
140 IFPEEK(KF)AND128THENP1=CP:Q1=CZ:GOTO200
150 IFPEEK(KN)AND2THENQ1=CP:P1=CZ
200 P=P+P1+P1:Q=Q+Q1:IFPOINT(P,Q)ORPOINT(P+CP,Q)THEN300
210 SET(P,Q):SET(P+CP,Q):C=C+CP:GOTO500
300 'B WINS
310 BS=BS+CP:W$="B":GOTO 730
500 'B INPUT
520 IFPEEK(KT)AND2THEN R1=CZ:S1=CN:GOTO600
530 IFPEEK(KT)AND4THENR1=CN:S1=CZ:GOTO600
540 IFPEEK(KT)AND8THENR1=CP:S1=CZ:GOTO600
550 IFPEEK(KT)AND32THENS1=CP:R1=CZ
600 R=R+R1+R1:S=S+S1:IFPOINT(R,S)OR POINT(R-CP,S)THEN 7
     00
610 SET(R,S):SET(R-CP,S):C=C+CP:GOTO100
700 'A WINS
710 AS=AS+CP:W$="A"
720 'END ROUTINE
730 IFW$="A"THENP5=577 ELSE P5=641
732 PRINT@P5,"*";
740 GOSUB950
745 PRINT@769,"SCREEN";
750 PRINT@833,"";:PRINTUSING"###";INT(100*C/2530+.5);:P
     RINT"%";
752 PRINT@898,"FULL";
760 H$=INKEY$:IFH$="" THEN 760 ELSE IF ASC(H$)<>13 THEN
     760
770 RESTORE:GOTO10
900 'BOXES
902 Z$=CHR$(179)
905 A$(1)=CHR$(159)+Z$+CHR$(175):A$(2)=CHR$(149)+Z$+CHR
     $(170)
910 A$(3)=CHR$(181)+CHR$(191)+CHR$(186):B$(1)=CHR$(151)
     +Z$+CHR$(175)
915 B$(2)=CHR$(149)+Z$+CHR$(174):B$(3)=CHR$(181)+Z$+CHR
     $(190)
920 P0=11+RND(21):Q0=1+RND(3):R0=38+RND(21):S0=8+RND(3)
925 U0=P0+64*Q0:L0=R0+64*S0
930 CLS:FOR I= 0 TO 2:PRINT@U0+64*I,A$(I+1);:PRINT@L0+6
     4*I,B$(I+1);:NEXT:RETURN
950 'SCORE
952 PRINT@513,"SCORE:";
954 PRINT@578,"A";AS;:PRINT@642,"B";BS;
956 RETURN
8000 'EDGE
8010 FOR X0=K0 TO 15423:POKEX0,131:NEXT
```

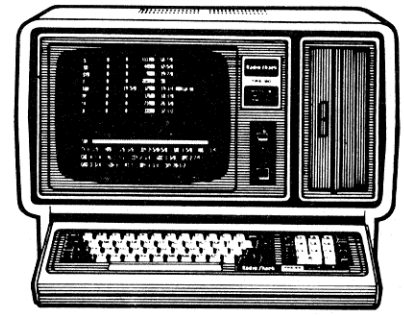
Program continues

```
8012 FOR X0=16320TO16383:POKEX0,176:NEXT
8020 FORR=0TO15:POKEK0+64*R,191:POKEK0+64*R+7,191:POKEK
     0+64*R+63,191:NEXT
8030 FOR C=1TO6:POKE K0+C,191:POKEK0+960+C,191:NEXT
8040 Z=K0+64:C9=0
8042 FOR N=1TO6:Z=Z+1:READ Y:POKEZ,Y:NEXT
8044 C9=C9+1:IFC9<7 THEN Z=Z+58:GOTO8042
8050 FOR Z=705 TO 710:PRINT@Z,CHR$(143);:NEXT
8888 RETURN
8900 DATA 149,136,140,140,140,162,181,178,179,179,179,1
     84
8910 DATA 151,168,188,188,188,130,189,178,179,179,179,1
     84
8920 DATA 159,161,188,188,180,139,149,168,188,188,188,1
     28
8930 DATA 143,143,143,143,143,143
9000  'INSTR
9003 CLS:GOSUB9400:PRINT
9010 PRINT" TWO PLAYERS USE THE KEYS BELOW TO MANEUVER
     THEIR SNAKES AROUND   THE SCREEN. THE FIRST PLAYER
      WHO RUNS INTO SOMETHING LOSES."
9100 PRINT:PRINTTAB(8)"PLAYER  A";TAB(46)"PLAYER  b"
9130 U$=CHR$(91):D$=CHR$(92):L$=CHR$(93):R$=CHR$(94)
9140 F$=L$+" Q  KEY  W "+R$:S$=L$+" J  KEY  K "+R$
9160 PRINTTAB(12)U$;TAB(50)U$
9170 PRINTTAB(12)"2";TAB(50)"I"
9200 PRINTTAB(6)F$;TAB(44)S$
9210 PRINTTAB(12)"A";TAB(50)"M"
9220 PRINTTAB(12)D$;TAB(50)D$
9230 PRINT" A SOLITAIRE VERSION CAN BE PLAYED BY OPERAT
     ING BOTH SNAKES (!)  AND TRYING TO MAXIMIZE THE %A
     GE SCORE SHOWN AT THE LOWER LEFT."
9250 PRINTTAB(19)"* HIT ANY KEY TO BEGIN *";
9260 H$=INKEY$:IFH$=""THEN9260 ELSE RETURN
9400 W$=CHR$(191):V$=CHR$(189)
9500 X$=W$+CHR$(143)+V$+" "+CHR$(190)+CHR$(143)+V$+" "+
     CHR$(190)+CHR$(143)+V$
9510 Y$=W$+CHR$(142)+V$+" "+W$+" "+W$+" "+W$+CHR$(176)+
     W$
9520 Z$=W$+CHR$(188)+CHR$(159)+" "+CHR$(175)+CHR$(188)+
     CHR$(159)+" "+W$+" "+W$
9532 PRINT@PO,X$;:PRINT@PO+64,Y$;:PRINT@PO+128,Z$
9540 RETURN
```

Program Listing 1. Boa

THE BIGGEST NAME IN LITTLE COMPUTERS™

TRS-80™ Model II — Your Best Buy In a Business Microcomputer



UP TO 15% OFF! on

TRS-80™ computers, software and peripherals

Similar values on all Radio Shack merchandise

CALL COLLECT:

915-283-2920

Van Horn Office Supply ✓137

701 W. Broadway -- P O Box 1060

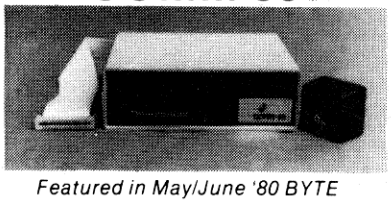
Van Horn, Texas 79855

MasterCard Radio Shack DEALER VISA

THE NATIONWIDE SUPERMARKET OF SOUND®

3 ALTERNATIVE INTERFACES FOR THE TRS-80

COMM-80™



Featured in May/June '80 BYTE

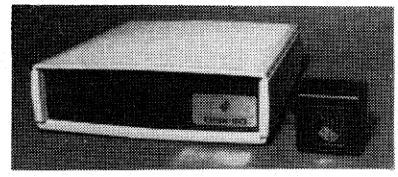
- RS-232-C port (50-19.2K baud) software/hardware selectable
- Centronics printer port 8-bit
- connects to keyboard or E. I.
- chain up to 16 units
- use with E. I. for 2nd printer
- includes terminal software

$139.95 Special

- only $179.95 complete

ALL INTERFACES ARE RADIO SHACK HARDWARE AND SOFTWARE COMPATIBLE AND CARRY A 60 DAY WARRANTEE INCLUDING PARTS AND LABOR. ALL UNITS INCLUDE USER'S MANUAL, POWER SUPPLY & AUXILIARY TRS-BUS CONNECTOR FOR FUTURE EXPANSION.

DISK-80™



Featured in March '81 BYTE

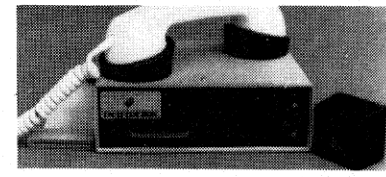
- disk controller (4 drives)
- hardware data separator
- includes 16K of RAM provision for additional 16K
- buffered TRS-bus connector
- real-time clock
- printer port (optional)

ASSEMBLED & TESTED
with 16K of RAM $329.95
Centronics Printer
Port add . . . . . $ 50.00
with 32K RAM add. . . $ 50.00
DISK-80 pc board. . . . . $ 48.00
Printer/Power Supply
pc board . . . . . $ 16.00
Complete Kit with 16K
RAM and Printer Port . $275.00

Dealer inquiries invited.

TRS-80 is trademark of Tandy Corp.

CHATTERBOX™



Featured in Aug. '80 BYTE

- 300 baud originate modem
- Centronics printer port 8-bit
- RS-232-C port (50-19.2K baud)
- connects to keyboard or E. I.
- received data automatically routed to printer ports
- includes terminal software
- only $279.95 complete

Call 1-800-645-3479, in N.Y. 1-516-374-6793

or write: The MicroMint Inc.
917 Midway
✓310 Woodmere, NY 11598

VISA MasterCharge

MICRO MINT

✓See List of Advertisers on page 306

A look at the Shack's new peripheral.

Talk to Your TRS-80

Art Welcher
360 S. Wetherly Drive
Beverly Hills, CA 90211

The Radio Shack Speech Recognition unit is now available and, judging from the demand, will prove to be very popular. It is called an Isolated Word-Speaker Trained system.

You read into the microphone, which is provided with the Voxbox, the words you want to install into memory. The box has a limited vocabulary of 32 words at one time. After reading these into memory, go into a "listen" mode via software programming. The computer then returns an index number for each word in its memory whenever it hears it. It also returns an error code when it hears a word it doesn't have in its vocabulary or when it doesn't understand the word.

From the return code index you may program the TRS-80 to do remarkable things!

These numbers can control software just as if you entered data via keyboard. And almost any program that asks for keyboard input may be changed to accept a vocal input through the microphone.

Additions

With the unit is a machine language driver program that must be read into high memory before the hardware functions. The SYSTEM command does this. Radio Shack has included three cassette tapes depending on whether you have 16K, 32K or 48K (Voxbox needs a minimum of 16K).

Also included are three demonstration programs. One is called VOXPLOT, and herein lies the key to the Speech Recognition unit. By running VOXPLOT we see a graph of the four parameters making up the identification pattern of each vocabulary word or phrase.

The first graph is the energy (dBs) of the 900 to 2200 hertz range. The second is the energy of the 100 to 900 hertz range. The third graph is the dominant frequency in the 900 to 5000 hertz band, and the fourth curve is the dominant frequency in the 200 to 900 hertz band.

The graphs are generated by reading these four parameters at 10 millisecond intervals for the duration of the spoken word or phrase up to a length of 1.5 seconds. If there is more than .1 second of silence, the computer assumes that is the end of that word/phrase.

These data are stored in a reserved position of the driver program which we played in with SYSTEM when we started. It now resides in high memory as part of the driver program. This operation is called the "training" of the computer.

When you enter a user program or one of the demo programs, you first train the computer by storing in the driver program the vocabulary that must accompany the user program.

It is not clear in the instructions that this must be done each time after powerup. Also, if you run two different programs requiring different vocabulary, you must "re-train" the computer each time. This obviously just won't do!

While the Driver Program is written for BASIC II, the instruction book furnishes information for converting programs to Disk BASIC, but there are errors. Remember, in Disk BASIC all POKE addresses higher than 32767 become negative numbers. It becomes much more convenient to use HEX numbers in the POKE,PEEK and DEFUSR(n) statements. Don't forget to use &H followed by the HEX number if you have more than a 16K machine.

The manual also includes a paragraph explaining in detail how to save the Driver Program on DISK using the TAPEDISK utility program. This works well. If you have NEWDOS plus, you may also save it on disk using LMOFFSET/CMD program and entering the correct addresses for your machine as shown under the TAPEDISK instruction in the manual.

The program included will create and save on disk a driver program complete with a set vocabulary file. Each user program may now have its own Vocab file/driver program, which will automatically load with the user program if you have NEWDOS. This means that you may enter a pre-trained vocabulary and not be required to train each time you use a program.

If you are using TRSDOS, you must make several changes in the routine for making and loading pre-trained vocabulary files.

```
line 70 delete "3. ENTER VOCAB 4. SAVE
  VOCAB"
line 80 delete 19000,19100
line 19010 add a REM to the first of the line
line 19110 add a REM to the first of the line
line 20005 delete "CMD"LOAD VDR"" and
  add
    PRINT " VOXBOX SOFTWARE NOT
            LOADED.
            RETURN TO DOS BY CMD'S'
            LOAD VDR
            BASIC* "
```

This is exactly what you must do each time. You must load the proper Vocab file/driver program before you load the Basic User program. If you have NEWDOS plus, the program will execute as shown, with nothing additional.

Vocab File

To make and SAVE a Vocab

Storm Coming?

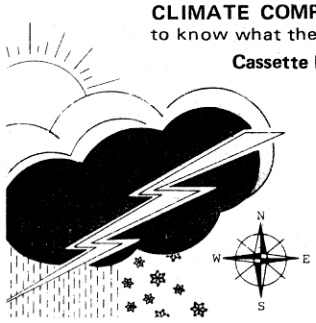
How many times have your plans revolved around the weather? Now you can turn your TRS-80 into a weather forecaster, and stop getting caught in the rain!!

CLIMATE-COMP was created by National Weather Service Meterologist, author and editor David Carman.

THE WEATHER FORECASTER program will give you a short range forecast for your area. Enter a few simple measurements, easily obtained from newspapers or the U.S. Weather Service, to receive a short range forecast for the next six hours.

THE WEATHER PLOT program is the result of years of carefully collected data. At your command are records, charts, graphs, facts and figures on local weather for every major city in the United States. Choose your area of the country and the data files will release a flood of information. Each city is listed with its monthly rainfall, monthly and yearly average temperature, average wind speed, snowfall, heating and cooling degree days, annual average sunshine, humidity and record-breaking temperatures.

CLIMATE COMP for all the information you need to know what the weather has in store for you.



Cassette based: system requires 16K, level II, Pkg. no. 0102R $19.95. Disk based: system requires 32K one disk drive, Pkg. no. 0316RD $24.95.

TO ORDER: Contact your local Instant Software dealer. If these programs are unavailable, call toll-free **1-800-258-5473**

*A trademark of Tandy Corporation

Instant Software™

PETERBOROUGH, N.H. 03458

Introducing . . .

OMNITERM

The Ultimate TRS-80™ Terminal Package . . . . At Last!

OMNITERM - The Ultimate TRS-80™ Terminal Package is now available after nearly 2 years in the making. Created as a result of dissatisfaction with existing terminal programs, **OMNITERM** is the **Most Powerful** and **Flexible** microcomputer intelligent terminal program at any price - **Bar None.** Now the **TRS-80™** can communicate with and transfer files to almost any computer system **Without** writing special software. **OMNITERM** solves the problem of computer systems that send 32, 40, or 80 column lines to your 64 column **TRS-80™** by **Reformatting** your screen for easy reading. **OMNITERM** can compensate for incompatibilities with 7 different translation tables, one to and from each device. This capability even allows **OMNITERM** to use codes such as **EBCDIC**, and translate them to the **TRS-80™s ASCII.** With **OMNITERM** you can even **Review** text that has **Scrolled Off** the **Screen!** At any time you can examine and change any of **OMNITERM's** settings, because **OMNITERM** gives you a **Full Status Display** of all functions. It works with all **ROM's** and **DOS's** since it uses only officially documented calls.

- **Spooled Printer**
- Single Key **Auto Signon**
- **Prompted** File Output
- True **Break** Key
- **X/Y Cursor Control**
- **Xon/Xoff** File Control
- **Repeat** Key
- **Lower Case** Support.
- Can **Echo** characters
- Sends **Special Characters** not on the **TRS-80** keyboard
- Control-G causes **"Beep"** sound and **Graphic Bell** to flash on the screen.
- Accepts all standard **VIDEOTEX™** control codes.
- Can configure the **UART** for baud rates from 50-19,200 baud.
- Can send text **Slowly** for computers that work at "typist" speed.
- Keeps continuous count of **Parity, Framing,** and **Overrun** errors.
- **Saves** a special file with proper settings for each different use.
- Includes: 60 page manual, **Text Editor,** Hex **Conversion Utilities.**

Everyone who sees **OMNITERM** is **Amazed** by its **Power** and **Ease of Use!** Requires **TRS-80** with 32K memory, 1 disk. $95 (plus shiping if C.O.D.). Call for shipment within 24 hours. Manual alone $15, refunded with purchase. Order by Visa, M/C or C.O.D. Personal checks delay 2-3 weeks. Mass. residents add 5% sales tax. Dealer Inquiries Invited.

lindbergh Systems

49B Beechmont Street, Worcester, MA 01609 (617) 799-2217 ✓391

Combine accurate flight characteristics with the best in animation graphics and you'll have SubLOGIC's

T80-FS1 Flight Simulator

for the TRS-80

SubLOGIC's T80-FS1 is the smooth, realistic simulator that gives you a real-time, 3-D, out-of-the-cockpit view of flight.

Thanks to fast animation and accurate representation of flight, the non-pilot can now learn basic flight control, including take-offs and landings! And experienced pilots will recognize how thoroughly they can explore the aircraft's characteristics.

Once you've acquired flight proficiency, you can engage in the exciting British Ace 3-D Aerial Battle Game included in the package. Destroy the enemy's fuel depot while evading enemy fighters.

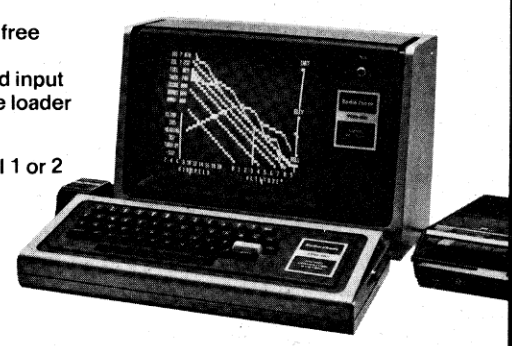
Computer and aviation experts call the T80-FS1 a marvel of modern technology. *You'll* simply call it *fantastic!*

Special Features:
- 3 frame-per-second flicker free animation
- Maximum transfer keyboard input
- Constant feedback cassette loader

Hardware Requirements:
- Radio Shack TRS-80, Level 1 or 2
- 16K memory
- *Nothing else!*

Only $25

See your dealer or order direct. For direct order, include $1.25 and specify UPS or first class mail. Illinois residents add 5% sales tax. Visa and Mastercard accepted.



subLOGIC
Communications Corp.
Box V, Savoy, IL 61874
(217) 359-8482
Telex: 206995 ✓150

file, you must first load the Driver Program in DOS. Next, load and RUN VOCTRAIN after you are in Basic; then return to DOS by using CMD"S" and execute a DUMP as outlined in the TRS-DOS manual where the format is identical to the instuction of line 19110 following CMD". That's why we REMed it instead of deleting. It is always there to see when you go to DOS.

By placing your own vocabulary in the DATA lines 20100 to 20140 you are ready to make and save a Vocab file. The line numbers in VOCTRAIN are purposely spaced out into complete sub sections so that it may be MERGEd more easily with your existing programs without extensive line renumbering.

The manual includes a small discussion on the driver program parameters, the most important being the rejection parameter. By POKEing a different number into the proper location you may loosen or tighten the fit of a spoken word to your Vocab file. By loosening the fit, you may have more mistakes of confusing two words, but less "WORD UNKNOWN". By tightening the fit you will have less errors of confusing one word with another in the file, but more "PLEASE REPEAT".

It is a simple experiment, and when you find the proper number for you, it should be POKEd before saving the Vocab file. It will then become a permanent part of the driver portion of that Vocab file.

If you have ever been in need of a good answer to the question, "What will that computer do?" the VOXBOX may well provide it. Besides the obvious demonstration programs (they work well and are guaranteed to boggle minds), it is not difficult to write a simple calculator program. Speak in a number, say the word "plus", then another number, say "equals" and see that the answer printed on the screen will cause the non-believer to start searching the floor for hidden buttons.

Automatic Bartender

I've also thought about an automatic bartender. Say the word "Martini" and a solenoid valve is opened permitting a shot of booze to fall into a plastic tube at the bottom of which is a glass of ice. The word "dry" opens the Vermouth solenoid valve (for a short time) into the same tube . . . not too difficult to attempt.

Light control, television control, door locks, drapery motors, movie screens, all are now in the realm of voice control, it may even be possible to do bookkeeping and write checks by voice! The applications are limitless. ■

Exact Replacement
BCCOMPCO PRINTER RIBBONS or CARTRIDGE RELOADS
(HEAVY INKING - LONGER LIFE)

*TRS-80#	CENTRONICS#	PRICE/PACK
LP I (26-1413)	#779.700-704	11.00/3 PACK
LP II (26-1413)	#730	11.00/3 PACK
LP III or V (26-1414)		9.00/RELOAD
III (YOU INSERT IN CARTRIDGE)		21.00/3 PACK
LP IV (26-1413)	#737	11.00/3 PACK
LP VI (26-1418)		9.00/RELOAD
VI (YOU INSERT IN CARTRIDGE)		21.00/3 PACK
NEW for the DAISY WHEEL II		
Multi-Strike Carbon Film (26-1419)		21.00/3 PACK
Multi-Str Carbon Film Reload		15.00/3 RELOADS
New Long-Life Fabric Reload		9.00/RELOAD

SEND PRINTER NUMBER and/or OLD CARTRIDGES (for Reloads)

MODEL II 8" GAME DISCS

VOLUME 1	VOLUME 2
Biorhythms, Trap	Ugly, Bingo
Concentration	Towers, Blackjack
Rip Cord, Yacht Sea	Farkle, Chomp
+4 More $24.95 per volume	+5 More

SEND CHECK or MONEY ORDER TO:
BCCOMPCO ✓237
800 South 17 • Box 246 • 417-932-4196
Summersville, Mo. 65571
*TRS-80 is a trademark of Radio Shack, a Tandy Corp.

RanDob

IT TAKES A THIEF **$10**
This adventure program takes you through a house. Take all you want, but don't wake anyone up!

RASPION ADVENTURE **$10**
Visit this deserted city and find Syl and its treasures.

PROPIX **$10**
NFL prediction program. Picks upsets and points. Picked over 60% of winners in 1980!

ETCH **$9**
Create pictures on your video screen and save them to tape or disk.

KEYSOUND **$4**
Makes sound with every printed character. User can specify variable or fixed pitch and duration.

All programs for 4k L2 except adventures, for 16k L2 or 32k Disk. Florida residents add 4% sales tax. Send check or money order to: RanDob, P.O. Box 1662, Boca Raton, FL 33432. ✓283

Condominium Hotel Reservation/Accounting System (MOD II)

50-100 units and reservations for 14 months on 2 drives, full reservation display, automatic unit selection, accounting on a unit basis, monthly accounting reports for owners.
(Dealers wanted) **$1500. U.S.**

Application Development Code for MOD (TRSDOS)

Set of gosubs for full screen I/O, file record field definition, record read/write, unpack/pack, change, delete, update, add, file/record, print, date conversion, error handling. Reduces any application to gosub call and logic.
$45.95 U.S.

Disk Cleaner And Air Filter Kit MOD I & II

Includes program, cleaner disk and filters for drive fans. Cleans both heads and pressure pads. (Disks should be cleaned every 50 hours to minimize wear.)
$29.95 U.S.

Cheque or Money order to:
DIAXIS Computer Group Ltd. ✓234
74 Cotton Dr.,
Port Credit, Ont. Canada
L5G 1Z9
(416) 274-6732

16K RAM PLUS **$31.95**
Kit includes 8 tested dynamic RAMs for memory expansion, instructions that make it very easy for anyone that's not experienced at handling, installing and testing RAMs to do the job, a RAM test program on cassette tape, etc. Completely guaranteed for 90 days. Add $2.95 for DIP shunts needed to upgrade 4K mem only.

32K RAM PLUS **$57.95**
You get the 16K kit described above plus 8 additional RAMs.

C-10 TAPES ..... **$.59**
You get computer quality, low noise C-10 blank cassettes with labels. Add .13 ea for plastic storage cassette box.

SOFTWARE:

RAM MEMORY TEST 1.1 The best test to find "flakey" or defective RAM **$2.95**

NEWBOOT 1.2 Press a single key to load and run your directory choice, BASIC or CMD programs. Assorted display lists all programs, Gran size, free disk space, etc. Has printout command, etc. for 1 or more drives **$19.95**

MEDICAL FORMS 1.2 The text editor with prepared office forms as patient history, surgery, etc. Saves the M.D. much time. A much used program by the surgeon **$49.95**

MasterCharge and Visa Cardholders
Telephone (817) 246-3778
or send check or money order to:
Digital Data Supply
P.O. Box 5061, Fort Worth, Texas 76108 ✓313
(Order now, prices may change next month)

FOTO-FILE

Organize your slides, negatives or albums by code, location, category or title. A MUST FOR PHOTOGRAPHERS.
L2 16K Tape $19.95 Disk $29.95

Also available:
DAILY APPOINTMENT CALENDAR
HOME BARTENDER GUIDE
LEARN GERMAN & others
Write for free brochure

TAPE-TRONICS ✓280
346 N. Western Ave.
Los Angeles, Ca. 90004

SPEED UP YOUR PROGRAMS

Do you have a BASIC program which you run often and find too slow ?

Now you can get it optimized to run faster.

We offer you a free estimate of the speed increase possible and the cost of achieving it.

Send us the following:

- The program and some records in the files involved (on disk or cassette)
- Running instructions/documentation (if present).
- What hardware and software is available ?
- Any other information you think is relevant to us in order to do a good job. E.g. other programs using the same files etc.

The methods we use include assembler language, compiler basic and file optimization.

The cost of conversion can range from $50 and up depending on program size and complexity.

GUARANTEE: you don't pay until you are satisfied with the converted program.

E C I ✓202
P.O. Box 357 VALLEY FORGE, PA 19481

✓See List of Advertisers on page 306

HOBBYWORLD ELECTRONICS, INC.

✓23

19511 Business Center Dr.
Northridge, CA 91324
Dept. V5

MAY SPECIALS

THE FLYING CIRCUS

Seven Action-packed Flight Simulations

- Mountain Pilot
- Precision Approach Radar
- O'Hare
- Jet Flight Polit
- Night Flight
- Airmail Pilot
- Air Flight Simulation
- Wt. 8 oz

Cat No. 2993 TRS-80 Mod 1, L2, 16K Disk $34.95

Call Toll Free:
(Outside Calif)
(800) 423-5387

California &
Outside USA:
(213) 886-9200

ASYLUM

You are on a cot in a small room when suddenly a handgrenade flies thru the window of your locked room. What you do next will save your life. 3-D perspective graphics. Wt. 4 oz

Cat No. 3022 TRS-80 Mod 1 & 3, 16K, Disk $18.95
Cat No. 3201 TRS-80 Mod 1 & 3, 16K, Cass $14.95

LNW RESEARCH

SYSTEM EXPANSION

for the TRS-80

Build this expansion board and Save! Build what you need to use now, then add the rest later. Wt. 12 oz

Cat No. 2969 Bareboard & Manual $69.95

HOW TO ORDER

Order by phone or by mail. Pay by check, Visa, Mastercard or C.O.D. (add $1.40 add'l for C.O.D.) We pay shipping when you mention this ad.

Send for your FREE HOBBYWORLD Catalogue. We carry a wide variety of hardware and software for your TRS-80 Computer.

Watch for our new name HW ELECTRONICS, appearing in our ads starting next month. We've changed our name because we believe computers are more than just a hobby.

Just like the real McCoy...
...except for the price and label

Super Savings on Printers for the TRS-80® New Low Price

Faster than any Radio Shack Printer

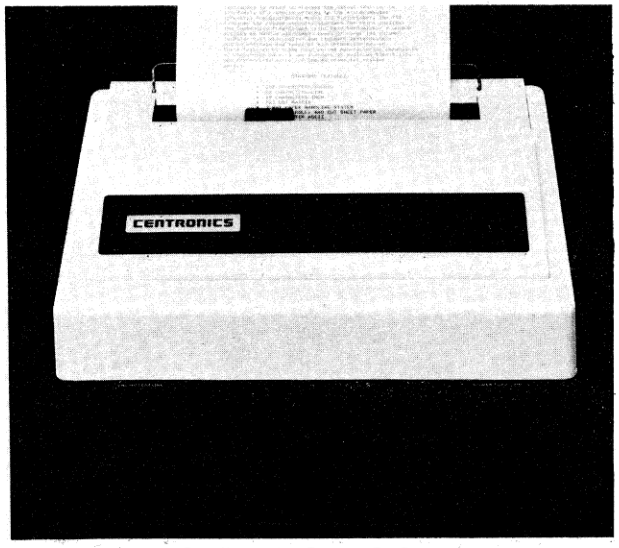
CENTRONICS 704-11
(same as 703-9)

CENTRONICS PARALLEL INTERFACE
Ideal for TRS-80

180 Characters Per Second, Bi-Directional, Logic Seeking, with Tractor
Adjustable to 16"

FORMER LIST PRICE $2975

NOW ONLY $1695



Disc Drive Values
for TRS-80
Your Choice
5¼" Disk Drives

Shugart, MPI-51, or Tandon
w/case & Power Supply

$499 VALUE

MMM PRICE ONLY

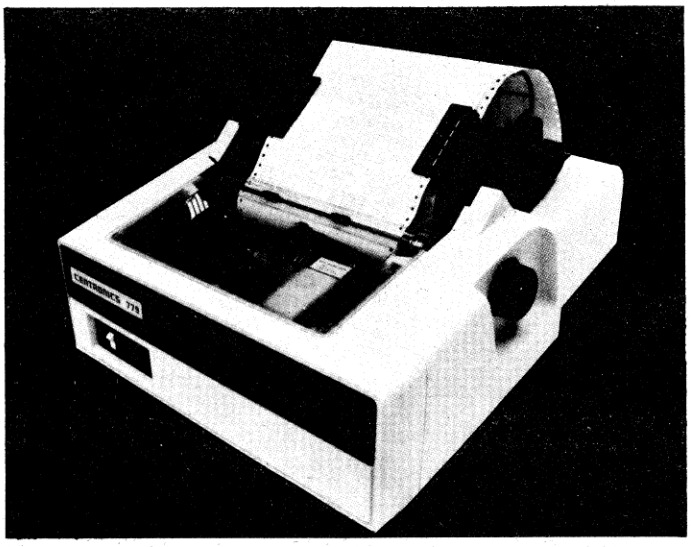
$329
2 for $638

CENTRONICS 730

Same as R.S. Line Printer II
LIST PRICE $795
(add $7.50 for shipping) **NOW ONLY $599**

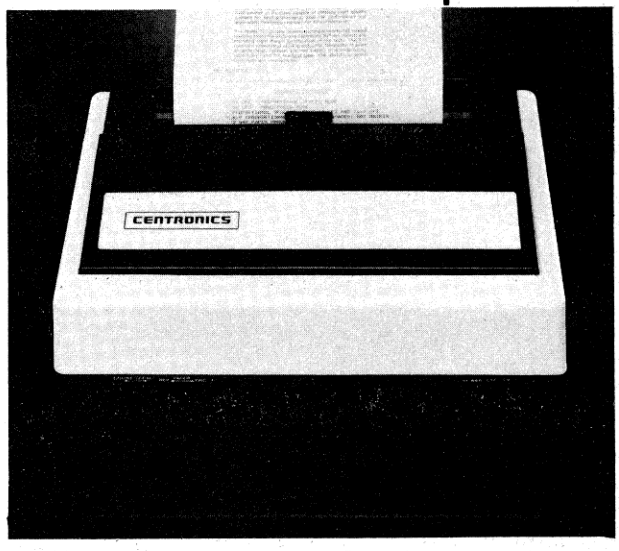
CENTRONICS 779-2

Same as R.S. Line Printer I w/tractor
LIST PRICE $1350
(Ship freight collect) **NOW ONLY $799**



CENTRONICS 737

Same as R.S. Line Printer IV
Featuring Correspondence Quality and Proportional Spacing
LIST PRICE $995 **NOW ONLY $799**



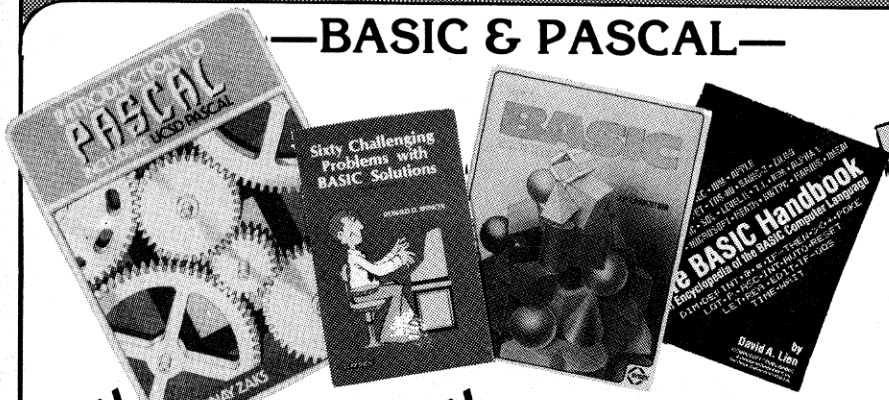
MiniMicroMart, Inc.

✓24

1618 James Street, Syracuse NY 13203 (315) 422-4467 TWX 710-541-0431

80 microcomputing T.M. bookshelf

—BASIC & PASCAL—



new new

- **50 BASIC EXERCISES**—BK1192—by J. P. Lamoitier. This book is structured around the idea that the best way to learn a language is through actual practice. It contains 50 completely explained exercises: statement and analysis of the problem, flowcharts, programs and actual runs. Program subjects include mathematics, business, games, and operations research, and are presented in varying levels of difficulty. This format enables anyone to learn BASIC rapidly, checking their progress at each step. $12.95*

- **THE BASIC HANDBOOK**—BK1174—by David Lien. This book is unique. It is a virtual ENCYCLOPEDIA of BASIC. While not favoring one computer over another, it explains over 250 BASIC words, how to use them and alternate strategies. If a computer does not possess the capabilities of a needed or specified word, there are often ways to accomplish the same function by using another word or combination of words. That's where the HANDBOOK comes in. It helps you get the most from your computer, be it a "bottom-of-the-line" micro or an oversized monster. $14.95.*

- **LEARNING LEVEL II**—BK1175—by David Lien. Written especially for the TRS-80, this book concentrates on Level II BASIC, exploring every important BASIC language capability. Updates are included for those who have studied the Level I User's Manual. Sections include: how to use the Editor, dual cassette operation, printers and peripheral devices, and the conversion of Level I programs to Level II. $15.95.*

- **BASIC BASIC (2ND EDITION)**—BK1026—by James S. Coan. This is a textbook which incorporates the learning of computer programming using the BASIC language with the teaching of mathematics. Over 100 sample programs illustrate the techniques of the BASIC language and every section is followed by practical problems. This second edition covers character string handling and the use of data files. $10.50.*

- **ADVANCED BASIC**—BK1000—Applications, including strings and files, coordinate geometry, area, sequences and series, simulation, graphing and games. $10.75*

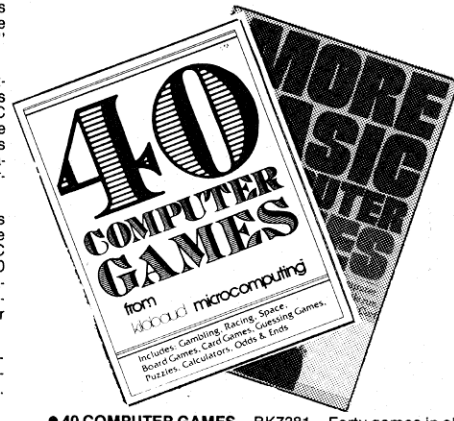
- **SIXTY CHALLENGING PROBLEMS WITH BASIC SOLUTIONS (2nd Edition)**—BK1073—by Donald Spencer, provides the serious student of BASIC programming with interesting problems and solutions. No knowledge of math above algebra required. Includes a number of game programs, as well as programs for financial interest, conversions and numeric manipulations. $6.95.*

- **PROGRAMMING IN PASCAL**—BK1140—by Peter Grogono. The computer programming language PASCAL was the first language to embody in a coherent way the concepts of structured programming, which has been defined by Edsger Dijkstra and C.A.R. Hoare. As such, it is a landmark in the development of programming languages. PASCAL was developed by Niklaus Wirth in Zurich; it is derived from the language ALGOL 60 but is more powerful and easier to use. PASCAL is now widely accepted as a useful language that can be efficiently implemented, and as an excellent teaching tool. It does not assume knowledge of any other programming language; it is therefore suitable for an introductory course. $12.95.*

- **PASCAL**—BK1188—by Paul M. Chirlian. Professor Chirlian's textbook combines a simple approach to the PASCAL language with comprehensive coverage on how a computer works, how to use a flowchart, working from a terminal as well as batch operation and debugging. Special attention is paid to idiosyncrasies of the language and syntax flowcharts abound for the convenience of the experienced programmer. Well indexed. $12.95*

- **INTRODUCTION TO PASCAL**—BK1189—by Rodnay Zaks. A step-by-step introduction for anyone wanting to learn the language quickly and completely. Each concept is explained simply and in a logical order. All features of the language are presented in a clear, easy-to-understand format with exercises to test the reader at the end of each chapter. It describes both standard PASCAL and UCSD PASCAL, the most widely used dialect for small computers. No computer or programming experience is necessary. $14.95.*

—GAMES—

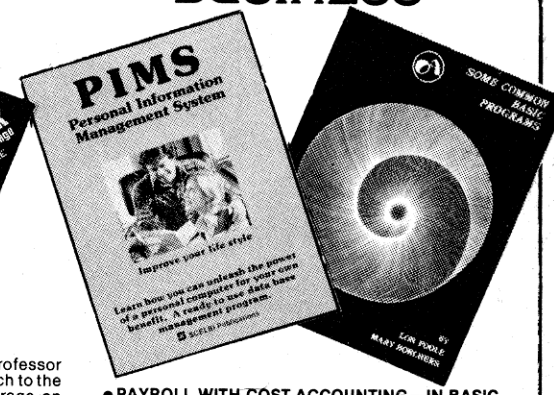


- **40 COMPUTER GAMES**—BK7381—Forty games in all in nine different categories. Games for large and small systems, and even a section on calculator games. Many versions of BASIC used and a wide variety of systems represented. A must for the serious computer gamesman. $7.95*

- **BASIC COMPUTER GAMES**—BK1074—Okay, so once you get your computer and are running in BASIC, then what? Then you need some programs in BASIC, that's what. This book has 101 games for you from very simple to real buggers. You get the games, a description of the games, the listing to put in your computer and a sample run to show you how they work. Fun. Any one game will be worth more than the price of the book for the fun you and your family will have with it. $7.50.*

- **MORE BASIC COMPUTER GAMES**—BK1182—edited by David H. Ahl. More fun in BASIC! 84 new games from the people who brought you *BASIC Computer Games*. Includes such favorites as Minotaur (battle the mythical beast) and Eliza (unload your troubles on the doctor at bargain rates). Complete with game description, listing and sample run. $7.50.*

—BUSINESS—

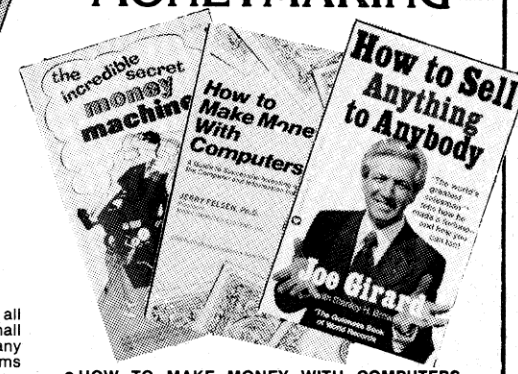


- **PAYROLL WITH COST ACCOUNTING—IN BASIC**—BK1001—by L. Poole & M. Borchers, includes program listings with remarks, descriptions, discussions of the principle behind each program, file layouts, and a complete user's manual with step-by-step instructions, flowcharts, and simple reports and CRT displays. Payroll and cost accounting features include separate payrolls for up to 10 companies, time-tested interactive data entry, easy correction of data entry errors, job costing (labor of distribution), check printing with full deduction and pay detail, and 16 different printed reports, including W-2 and 941 (in **CBASIC**). $20.00.*

- **SOME COMMON BASIC PROGRAMS**—BK1053—published by Adam Osborne & Associates, Inc. Perfect for non-technical computerists requiring ready-to-use programs. Business programs, plus miscellaneous programs. Invaluable for the user who is not an experienced programmer. All will operate in the standalone mode. $14.99 paperback.

- **PIMS: PERSONAL INFORMATION MANAGEMENT SYSTEM**—BK1009—Learn how to unleash the power of a personal computer for your own benefit in this ready-to-use data-base management program. $11.95.*

—MONEYMAKING—



- **HOW TO MAKE MONEY WITH COMPUTERS**—BK1003—In 10 information-packed chapters, Jerry Felsen describes more than 30 computer-related, money-making, high profit, low capital investment opportunities. $15.00.*

- **HOW TO SELL ANYTHING TO ANYBODY**—BK7306—According to *The Guinness Book of World Records*, the author, Joe Girard, is "the world's greatest salesman." This book reveals how he made a fortune—and how you can, too. $2.25.*

- **THE INCREDIBLE SECRET MONEY MACHINE**—BK1178—by Don Lancaster. A different kind of "cookbook" from Don Lancaster. Want to slash taxes? Get free vacations? Win at investments? Make money from something that you *like* to do? You'll find this book essential to give you the key insider details of what is really involved in starting up your own money machine. $5.95.*

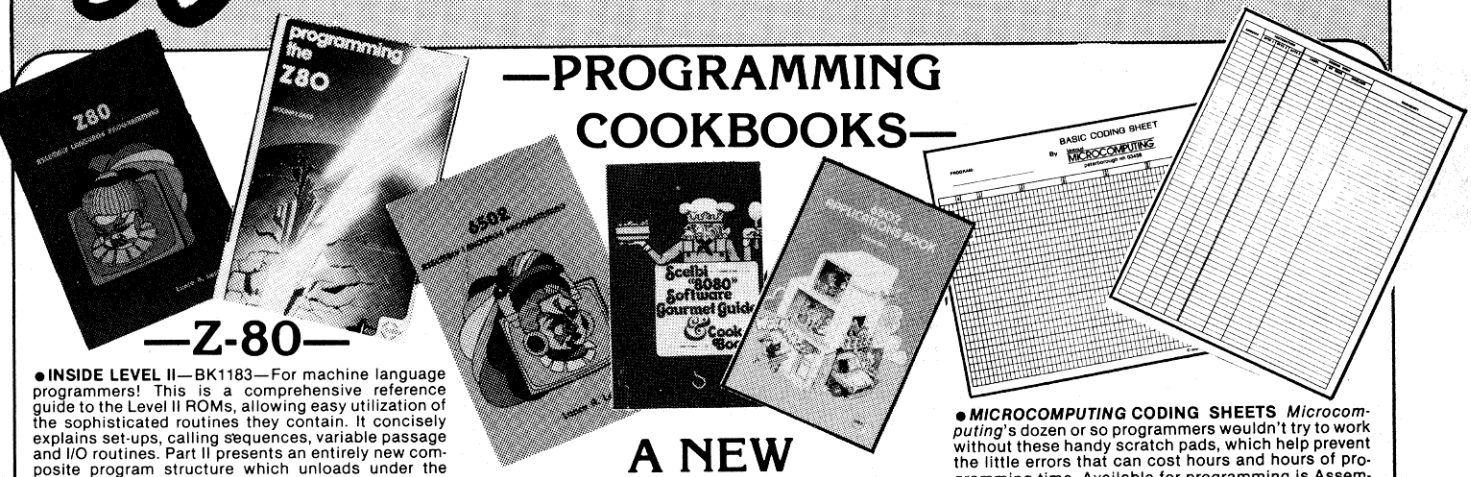
*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf • Peterborough NH 03458. Be sure to include check or detailed credit card information.

No C.O.D. orders accepted. All above add $1.00 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

80 microcomputing T.M. bookshelf



—PROGRAMMING COOKBOOKS—

—Z-80—

● **INSIDE LEVEL II**—BK1183—For machine language programmers! This is a comprehensive reference guide to the Level II ROMs, allowing easy utilization of the sophisticated routines they contain. It concisely explains set-ups, calling sequences, variable passage and I/O routines. Part II presents an entirely new composite program structure which unloads under the SYSTEM command and executes in both BASIC and machine code with the speed and efficiency of a compiler. Special consideration is given to disk systems. $15.95.*

● **PROGRAMMING THE Z-80**—BK1122—by Rodnay Zaks. Here is assembly language programming for the Z-80 presented as a progressive, step-by-step course. This book is both an educational text *and* a self-contained reference book, useful to both the beginning and the experienced programmer who wish to learn about the Z-80. Exercises to test the reader are included. $14.95.*

● **Z-80 SOFTWARE GOURMET GUIDE AND COOKBOOK**—BK1045—by Nat Wadsworth. Scelbi's newest cookbook! This book contains a complete description of the powerful Z-80 instruction set and a wide variety of programming information. Use the author's ingredients including routines, subroutines and short programs, choose a time-tested recipe and start cooking! $16.99.*

● **Z-80 ASSEMBLY LANGUAGE PROGRAMMING**—BK1177—by Lance A. Leventhal. This book thoroughly covers the Z-80 instruction set, abounding in simple programming examples which illustrate software development concepts and actual assembly language usage. Features include Z-80 I/O devices and interfacing methods, assembler conventions, and comparisons with 8080A/8085 instruction sets and interrupt structure. $16.99.*

TEST EQUIPMENT —LIBRARY—

● **VOL. I COMPONENT TESTERS**—LB7359—. . . how to build transistor testers (8), diode testers (3), IC testers (3), voltmeters and VTVMs (9), ohmmeters (8 different kinds), inductance (3), capacity (9), Q measurement, crystal checking (6), temperature (2), aural meters for the blind (3) and all sorts of miscellaneous data on meters. . . using them, making them more versatile, making standards. Invaluable book. $4.95.*

● **VOL. II AUDIO FREQUENCY TESTERS**—LB7360—. . . jam packed with all kinds of audio frequency test equipment. If you're into SSB, RTTY, SSTV, etc., this book is a must for you. . . a good book for hi-fi addicts and experimenters, too! $4.95.*

● **VOL. III RADIO FREQUENCY TESTERS**—LB7361—Radio frequency waves, the common denominator of Amateur Radio. Such items as SWR, antenna impedance, line impedance, rf output and field strength; detailed instructions on testing these items includes sections on signal generators, crystal calibrators, grid dip oscillators, noise generators, dummy loads and much more. $4.95.*

● **VOL. IV IC TEST EQUIPMENT**—LB7362—Become a troubleshooting wizard! In this fourth volume of the 73 TEST EQUIPMENT LIBRARY are 42 home construction projects for building test equipment to work with your ham station and in servicing digital equipment. Plus a cumulative index for all four volumes for the 73 TEST EQUIPMENT LIBRARY. $4.95.*

A NEW PROGRAMMING —SERIES—

The Microprocessor Software Engineering Series by John Zarrella provides common sense descriptions of advanced computer system topics for engineers, programmers and development managers. Each volume is a self-contained review of a software engineering topic, explaining fundamental concepts in easy-to-understand language and describing sophisticated software tools and techniques. Detailed glossary of technical jargon is included in each volume. This series will help you find the solutions to your software problems.

● **OPERATING SYSTEMS: CONCEPTS AND PRINCIPLES**—BK1193—Presents an overview of the basic operating system types, their components and capabilities. $7.95.*

● **WORD PROCESSING AND TEXT EDITING**—BK1194—Provides a firm basis for understanding word processing terminology and for comparing systems. $7.95.*

● **SYSTEM ARCHITECTURE**—BK1195—Presents a detailed overview of advanced computer system design including object architecture and capability-based addressing. $9.95.*

—6502—

● **PROGRAMMING THE 6502 (Third Edition)**—BK1005—Rodnay Zaks has designed a self-contained text to learn programming, using the 6502. It can be used by a person who has never programmed before, and should be of value to anyone using the 6502. The many exercises will allow you to test yourself and practice the concepts presented. $12.95.*

● **6502 APPLICATIONS BOOK**—BK1006—Rodnay Zaks presents practical-application techniques for the 6502 microprocessor, assuming an elementary knowledge of microprocessor programming. You will build and design your own domestic-use systems and peripherals. Self-test exercises included. $12.95.*

● **6502 ASSEMBLY LANGUAGE PROGRAMMING**—BK1176—by Lance A. Leventhal. This book provides comprehensive coverage of the 6502 microprocessor assembly language. Leventhal covers over 80 programming examples from simple memory load loops to complete design projects. Features include 6502 assembler conventions, input/output devices and interfacing methods, and programming the 6502 interrupt system. $16.99.*

● **6502 SOFTWARE GOURMET GUIDE AND COOKBOOK**—BK1055—by Robert Findley. This book introduces the BASIC language programmer into the realm of machine-language programming. The description of the 6502 structure and instruction set, various routines, subroutines and programs are the ingredients in this cookbook. "Recipes" are included to help you put together exactly the programs to suit your taste. $12.95.*

● ***MICROCOMPUTING* CODING SHEETS** *Microcomputing*'s dozen or so programmers wouldn't try to work without these handy scratch pads, which help prevent the little errors that can cost hours and hours of programming time. Available for programming is Assembly/Machine Language (PD1001), which has columns for address, instruction (3 bytes), source code (label, op code, operand) and comments; and for BASIC (PD1002) which is 72 columns wide. 50 sheets to a pad. $2.39.*

—8080/8080A—6800—

● **8080A/8085 ASSEMBLY LANGUAGE PROGRAMMING**—by Lance Leventhal—BK1004—Assembly language programming for the 8080A/8085 is explained with a description of the functions of assemblers and assembly instructions, and a discussion of basic software development concepts. Many fully debugged, practical programs are included as is a special section on structured programming. $15.99.*

● **8080 PROGRAMMING FOR LOGIC DESIGN**—BK1078—Ideal reference for an in-depth understanding of the 8080 processor. Application-oriented and the 8080 is discussed in light of replacing conventional, hard-wired logic. Practical design considerations are provided for the implementation of an 8080-based control system. $9.50.*

● **8080 SOFTWARE GOURMET GUIDE AND COOKBOOK**—BK1102—If you have been spending too much time developing simple routines for your 8080, try this new book by Scelbi Computing and Robert Findley. Describes sorting, searching, and many other routines for the 8080 user. $12.95.*

● **6800 PROGRAMMING FOR LOGIC DESIGN**—BK1077—Oriented toward the industrial user, this book describes the process by which conventional logic can be replaced by a 6800 microprocessor. Provides practical information that allows an experimenter to design a complete micro control system from the "ground up." $9.50.*

● **6800 SOFTWARE GOURMET GUIDE AND COOKBOOK**—BK1075—Like its culinary cousin, *The 8080 Gourmet Guide*, this book by Scelbi Computing and Robert Findley describes sorting, searching and other routines—this time for the 6800 user. $12.95.*

—COOKBOOKS—

● **CMOS COOKBOOK**—BK1011—by Don Lancaster. Details the application of CMOS, the low power logic family suitable for most applications presently dominated by TTL. Required reading for every serious digital experimenter! $10.50.*

● **TVT COOKBOOK**—BK1064—by Don Lancaster. Describes the use of a standard television receiver as a microprocessor CRT terminal. Explains and describes character generation, cursor control and interface information in typical, easy-to-understand Lancaster style. $9.95.*

● **TTL COOKBOOK**—BK1063—by Don Lancaster. Explains what TTL is, how it works, and how to use it. Discusses practical applications, such as a digital counter and display system, events counter, electronic stopwatch, digital voltmeter and a digital tachometer. $9.50.*

*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf ● Peterborough NH 03458. Be sure to include check or detailed credit card information.

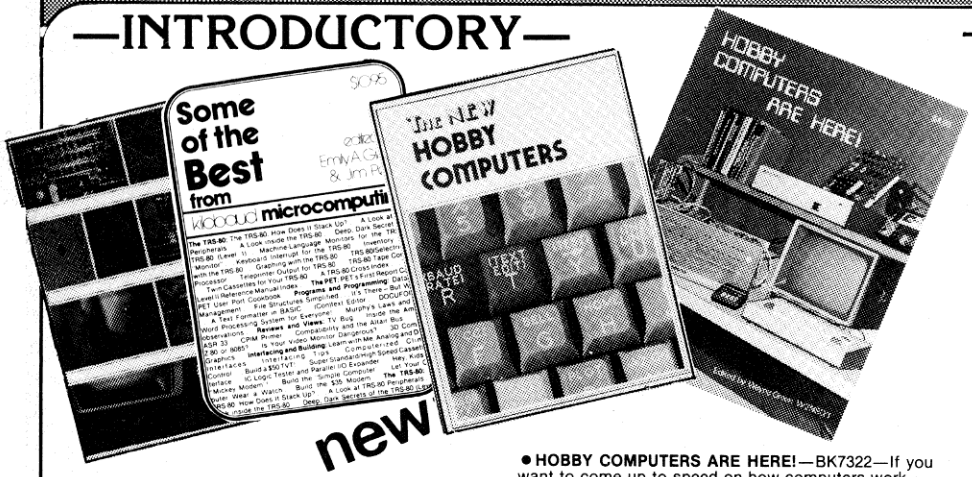
No C.O.D. orders accepted. All above add $1.00 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

80 microcomputing T.M. bookshelf

—INTRODUCTORY—



new

● **YOUR FIRST COMPUTER**—BK1191—by Rodney Zaks. Whether you are using a computer, thinking about using one or considering purchasing one, this book is indispensable. It explains what a computer system is, what it can do, how it works and how to select various components and peripheral units. It is written in everyday language and contains invaluable information for the novice and the experienced programmer. (The first edition of this book was published under the title "An Introduction to Personal and Business Computing".) $7.95*

● **SOME OF THE BEST FROM KILOBAUD MICROCOMPUTING**—BK7311—A collection of the best articles that have appeared in Kilobaud MICROCOMPUTING. Included is material on the TRS-80 and PET systems, CP/M, the 8080/8085/Z-80 chips, the ASR-33 terminal. Data base management, word processing, text editors and file structures are covered too. Programming techniques and hard-core hardware construction projects for modems, high speed cassette interfaces and TVTs are also included in this large format, 200 plus page edition. $10.95.*

● **HOBBY COMPUTERS ARE HERE!**—BK7322—If you want to come up to speed on how computers work... hardware and software...this is an excellent book. It starts with fundamentals and explains the circuits, and the basics of programming, along with a couple of TVT construction projects, ASCII-Baudot, etc. This book has the highest recommendations as a teaching aid. $4.95.*

● **UNDERSTANDING AND PROGRAMMING MICROCOMPUTERS**—BK7382—A valuable addition to your computing library. This two-part text includes the best articles that have appeared in 73 and Kilobaud Microcomputing magazines on the hardware and software aspects of microcomputing. Well-known authors and well-structured text helps the reader get involved. $10.95*

● **THE NEW HOBBY COMPUTERS**—BK7340—This book takes it from where "HOBBY COMPUTERS ARE HERE!" leaves off, with chapters on Large Scale Integration, how to choose a microprocessor chip, an introduction to programming, low cost I/O for a computer, computer arithmetic, checking memory boards...and much, much more! Don't miss this tremendous value! Only $4.95.*

— INTRODUCTION — TO MICROCOMPUTERS (VOL. 0–III)

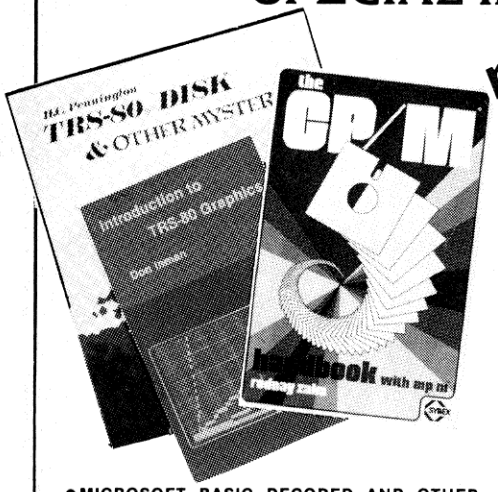
● **AN INTRODUCTION TO MICROCOMPUTERS, VOL. 0**—BK1130—The Beginner's Book—Written for readers who know nothing about computers—for those who have an interest in how to use computers—and for everyone else who must live with computers and should know a little about them. The first in a series of 4 volumes, this book will explain how computers work and what they can do. Computers have become an integral part of life and society. During any given day you are affected by computers, so start learning more about them with Volume 0. $7.95.*

● **VOL. I**—BK1030—**2nd Edition completely revised.** Dedicated to the basic concepts of microcomputers and hardware theory. The purpose of Volume I is to give you a thorough understanding of what microcomputers are. From basic concepts (which are covered in detail), Volume I builds the necessary components of a microcomputer system. This book highlights the difference between minicomputers and microcomputers. $12.99.*

● **VOL. II**—BK1040 (with binder)—Contains descriptions of individual microprocessors and support devices used only with the parent microprocessor. Volume II describes all available chips. $31.99*

● **VOL. III**—BK1133 (with binder)—Contains descriptions of all support devices that can be used with any microprocessor. $21.99*

—SPECIAL INTERESTS—



new

● **MICROSOFT BASIC DECODED AND OTHER MYSTERIES**—BK1186—by James Farvour. From the company that brought you *TRS-80 DISK AND OTHER MYSTERIES*! Contains more than 6500 lines of comments for the disassembled Level II ROMs, six additional chapters describing every BASIC subroutine, with assembly language routines showing how to use them. Flowcharts for all major routines give the reader a real insight into how the interpreter works. $29.50.

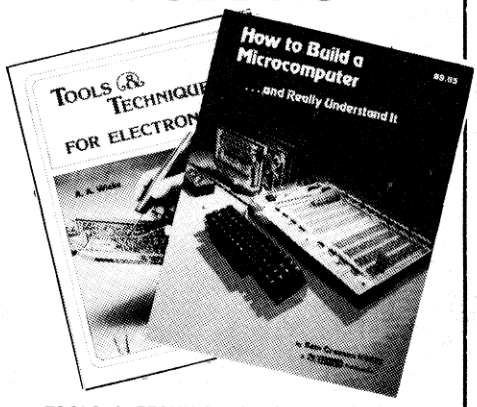
● **THE CP/M HANDBOOK (with MP/M)**—BK1187—by Rodney Zaks. A complete guide and reference handbook for CP/M—the industry standard in operating systems. Step-by-step instruction for everything from turning on the system and inserting the diskette to correct user discipline and remedial action for problem situations. This also includes a complete discussion of all versions of CP/M up to and including 2.2, MP/M and CDOS. $14.95*.

● **INTRODUCTION TO TRS-80 GRAPHICS**—BK1180—by Don Inman. Dissatisfied with your Level I or Level II manual's coverage of graphics capabilities? This well-structured book (suitable for classroom use) is ideal for those who want to use all the graphics capabilities built into the TRS-80. A tutorial method is used with many demonstrations. It is based on the Level I, but all material is suitable for Level II use. $8.95.*

● **TRS-80 DISK AND OTHER MYSTERIES**—BK1181—by Harvard C. Pennington. This is the definitive work on the TRS-80 disk system. It is full of detailed "How to" information with examples, samples and in-depth explanations suitable for beginners and professionals alike. The recovery of one lost file is worth the price alone. $22.50.*

● **MICROPROCESSOR INTERFACING TECHNIQUES**—BK1037—by Austin Lesea & Rodney Zaks—will teach you how to interconnect a complete system and interface it to all the usual peripherals. It covers hardware and software skills and techniques, including the use and design of model buses such as the IEEE 488 or S-100. $15.95.*

FOR THE ELECTRONICS — HOBBYIST —



● **TOOLS & TECHNIQUES FOR ELECTRONICS**—BK7348—by A. A. Wicks is an easy-to-understand book written for the beginning kit builder as well as the experienced hobbyist. It has numerous pictures and descriptions of the safe and correct ways to use basic and specialized tools for electronic projects as well as specialized metal working tools and the chemical aids which are used in repair shops. $4.95.*

● **HOW TO BUILD A MICROCOMPUTER—AND REALLY UNDERSTAND IT**—BK7325—by Sam Creason. The electronics hobbyist who wants to build his own microcomputer system now has a practical "How-To" guidebook. This book is a combination technical manual and programming guide that takes the hobbyist step-by-step through the design, construction, testing and debugging of a complete microcomputer system. Must reading for anyone desiring a true understanding of small computer systems. $9.95.*

*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf ● Peterborough NH 03458. Be sure to include check or detailed credit card information.

No C.O.D. orders accepted. All above add $1.00 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MIDWEST COMPUTER PERIPHERALS

INVENTORY CLEARANCE SALE
PRICES SLASHED!!

COMPUTER SYSTEMS

ALTOS MODEL ACS-8000-2 64k, 2 drive, single user	$3769
MODEL ACS-8000-5MU2 112k, 2 drive, two user	$5809
APF IMAGINATION MACHINE Complete System	$1015
APPLE II plus 16k	$1096
ATARI 400	$492
ATARI 800	$877
COMPUCOLOR 3 8k complete package	$1478
RADIO SHACK MODEL III 16k	$899
EXPANSION INTERFACE OK	$274
MODEL II 64k w/ one drive	$3499
We carry the complete **RADIO SHACK** line at a discount	
SD SALES SDS-100	*6299
SDS-200	*$6699
ZENITH Z-89 (48k)	$2447

PRINTERS

ANACOM 150 150 cps, bi-directional, 9 x 9 matrix	$1319
ANADEX DP-9500	$1529
CENTRONICS MODEL 779 TRACTOR PRINTER	$999
737 "Letter Quality" w/ cable	$815
We Carry the complete **CENTRONICS line!**	
DIABLO MODEL 630 RO w/Tractors	*$2579
EPSON MX-70	$399
MX-80 Tractor feed, bi-directional, 80 cps	$550
INTEGRAL DATA IDS 445G w/2K Buffer & Graphics w/Cable	$752
IDS-460 w/Cable	$1209
MPI MT-88 TRACTOR PRINTER w/cable	$659
MT-88G Graphics printer w/ cable	$699
OKIDATA 82 Bi-directional w/ tractor cable	$862
83 15" Carrage/Bi-directional	$1099
NEC SPINWRITER 5510 RO Serial	*$2579
5520 KSR Serial	*$2879
5530 RO Parallel	*$2579
OKIDATA MICROLINE 80 PRINTER 80 cps, 9 x 7 matrix	$554
w/Tractors and cable	$679
TEXAS INSTRUMENTS 810 Basic	*$1499
TRS-232 PRINTER INTERFACE	$59
Allows you to use any serial printer with the **TRS-80.**	

WE NOW TAKE
AMERICAN EXPRESS

AMERICAN EXPRESS Card

TERMINALS

HAZELTINE MODEL 1510	* $1099
1520	*$1360
PERKIN-ELMER BANTAM	*$799
SOROC IQ 120	*$759
IQ 140	*$1199
TELEVIDEO 912C	*$799
920C	*$859
ZENITH Z-19	*$899

CALIFORNIA COMPUTER SYSTEMS

MODEL 2016C 16k Static RAM board, A & T	$242
2200 MAINFRAME A & T	$352
MOTHERBOARD 12 slots, A & T	$101

APPLE PRODUCTS

Model 7440 PROGRAMMABLE TIMER BOARD A & T	$99
7470 3¾ DIGIT BCD A to D Converter A & T	$102
7490 GPIB (IEEE 488-1978) INTERFACE A & T	$202
7710 ASYNCHRONOUS SERIAL INTERFACE A & T	$132
7712 SYNCHRONOUS SERIAL INTERFACE A & T	$142
7720 PARALLEL INTERFACE A & T	$99
7811 ARITHMETIC PROCESSOR A & T	$356
7114 12k ROM/PROM Module A & T	$69

We carry the complete line of **CCS** products

SD SALES S-100 BOARDS

MODEL Expandoram (NO RAM)	KIT	$192
VDP-8024	KIT	$302
VDB-8024	A & T	$402
VDB-8024	A & T	$402
Z-80 STARTER KIT		$302
Z-80 STARTER SYSTEM	A & T	$382
SBC-100	KIT	$252
SBC-100	A & T	$305
SBC-200	KIT	$274
Versafloppy	Kit	$223
Versafloppy	A & T	$295
Versafloppy II Double Density	KIT	$305
Versafloppy II Double Density	A & T	$376

master charge THE INTERBANK CARD

Midwest Computer Peripherals

1467 S. Michigan Ave.
Chicago, IL 60605

VISA

WE PAY UPS CHARGES ON MOST ORDERS
IN THE CONTINENTAL U.S.

FLOPPY DISK STORAGE

CORVUS 11T 10 MEGABYTE HARD DISK *$4029
Fully compatible with **TRS-80, APPLE II,** and **S-100**

MPI MODEL B51 $321
TRS-80 plug-in compatible 5.25" single headed 40 track drive. Comes complete with case and power supply. **90 DAY WARRANTY.**

BARE DRIVES
(No Case or Power Supply)

5" MODELS

MPI MODEL 51	40 tracks, 5 ms.	$254
MPI MODEL 52	Double headed, 80 tracks	$299
MPI MODEL 91	80 tracks	$299
MPI MODEL 92	160 Tracks, Double headed	$399

5.25" POWER SUPPLIES WITH CASE

STANDARD MINI DISK POWER SUPPLY WITH CASE	$80
DELUXE MINI DISK POWER SUPPLY w/CASE & extender card	$131
DUAL MINI DISK POWER SUPPLY w/CASE	$121
DISK DRIVE EXTENDER CABLE	$16

DRIVE CABLES

1 DRIVE TRS-80 CABLE	$24
2 DRIVE TRS-80 CABLE	$29
3 DRIVE TRS-80 CABLE	$35
4 DRIVE TRS-80 CABLE	$40

We'll make any cable! Call us with specs.

THE DOUBLER by PERCOM DATA $203
Double density controller for **TRS-80 Model I.** With data separator. (Use your **PERCOM DISCOUNT** coupon)
DATA SEPARATOR by Percom Data $29
Stops read errors on inner tracks.

SOFTWARE

NEWDOS (40 Track)	$49
NEWDOS + (40 Track)	$99
NEWDOS 80	$139
MICROSOFT FORTRAN	$85
Z80 Softcard	$305
Super Utility	$49
Make 80	$14
Electric Pencil (disk)	$130

10% off all **RADIO SHACK** software

We carry SBSG, Microsoft, personal software, Apparatt and many other brands. All at a discount.

030181

DISKETTES
(Prices per box of 10)

		VERBATIM	NEW SYNCOM	MEMOREX
5 1/4"	Single sided, single density	$31	$35	$28
	Single sided, double density	$40	$39	$32
	Double sided, single density	$48	N/A	N/A
	Double sided, double density	$48	$52	$40
8"	Single sided, single density	$41	$31	$33
	Single sided, double density	$51	$40	$41
	Double sided, single density	$61	$49	$55
	Double sided, double density	$61	$49	$50

When ordering diskettes, please give us your make and model number of computer or disk drive, or give us the brand and part number of the diskettes you are currently using.

5 1/4"	**LIBRARY CASE** holds 10 disks	$3.95
	BINDER HOLDER holds 2 disks	10 for $7.95
8"	**LIBRARY CASE** holds 10 disks	$4.95
	BINDER HOLDER holds 2 disks	10 for $19.95
FLOPPY SAVER		5 1/4" $14.95
		8" $16.95
		Refills also available!

16k **MEMORY KITS** 200 ns $39.00
NEC UPD416C-2 prime dynamic RAM. Compatible with TRS-80, APPLE, or any computer specifying 4116 dynamic RAM.

HOW TO ORDER:
PHONE ORDERS: HOURS 10AM - 5PM CST MON - FRI
BY CHECK: Call in your order then send us a cashiers check or money order. This way we can have your order waiting for you when your check arrives. Personal checks require 10-14 days to clear.
BY CREDIT CARD: Just have your **MASTER CHARGE** or **VISA** or **AMERICAN EXPRESS** handy, we'll do the rest.
MAIL ORDERS: NEW ADDRESS 1467 South Michigan Ave., Chicago, IL 60605.
ALL MAIL ORDERS: Send your **NAME** and **STREET ADDRESS** (we ship UPS), **CITY, STATE, ZIP CODE AND TELEPHONE NUMBER** along with your order.
BY CHECK: Include a cashiers check or money order with your order. Personal checks require 10-14 days to clear. For your safety, mail your order via insured mail. **BETTER SAFE THAN SORRY.**
BY CREDIT CARD: Neatly type or print your **MASTER CHARGE** or **VISA** account number along with the expiration date and 4 digit interbank number (MC only).
IL. RES. ADD 6% SALES TAX

SHIPPING INFORMATION: We pay all UPS ground service charges (USA only, BLUE LABEL EXTRA) on all items except those denoted with an asterisk (*). (*) items must go airfreight or truck and can be sent freight collect.
FOREIGN ORDERS WELCOME, CALL OR WRITE.
ALL orders F.O.B. Chicago, Il.

WARRANTY INFORMATION: All Equipment carries a 90 day parts and labor warranty, unless otherwise noted. Warranty repair or replacement will be provided at no charge, excluding shipping costs. **10 DAY MONEY BACK GUARANTEE:** If within ten days you return merchandise in new and re-saleable condition we will refund your original purchase price. All refunds, exchanges or repairs include original cartons, packaging, and manuals and be in new and re-saleable condition and accompanied by your original invoice. A 10% re-stocking fee may be charged on returns at our discretion.
Not responsible for typographical errors
Prices subject to change without notice
Dealer inquiries welcome
TRS-80™ TANDYCORP.

SAVE TIME. . .ORDER BY PHONE
TOLL FREE: 800-621-3229
IN ILLINOIS: 312-987-1024

✓8

MIDWEST COMPUTER PERIPHERALS

1467 South Michigan Av.
Chicago, IL. 60605

We pay UPS charges on most orders in continental U.S.

✓See List of Advertisers on page 306

LIST OF ADVERTISERS

RS Number		Page
452	A. M. Electronics	126
129	Aardvark	257
56	ABM Products	141
172	AGS Software	73
229	Access Unlimited	67
265	Ace Computer Prod	277
34	Acorn Software Products	143
164	Advanced Business Microsystems	76
260	Adv. Mngtmt. Strategies	23
222	Adventure International	86
213	Adventure International	86
224	Adventure International	86
387	Aerocomp, Inc	150, 151
169	Alford & Assoc	76
69	Alpha Byte Storage	29, 259
210, 262	Alpha Products Company	34, 35
124	Alphanetics	186
138	Alternate Source, The	115, 134, 197, 257
484	American Business Computers	116
396	American Business Computers	116
397	American Business Computers	116
483	American Business Computers	116
317	American Business Computers	117
322	American Business Computers	117
192	American Business Computers	116
211	American Business Computers	117
196	American Business Computers	117
356	American Business Computers	117
267	American Business Computers	118
227	American Computer Development	189
461	Ancie Labs	174
264	Apparat, Inc	55-56
47	Applied Economic Analysis	132
*	Archbold Electronics	203
491	Arcsoft	277
445	AT-80	220
146	Audio Video Systems	68, 184
48	Automated Simulations	36
152	BAPS Software	170
201	Barstarnn Corporation	289
49	Basics and Beyond, Inc	218
186	Baysian Investment Services	128
237	BCCOMPCO	298
357	Big Five Software Company	175
60, 61, 122, 380, 478	B T Enterprises	49
382	Business Micro Products	131
145	C + S Electronics	293
38	Case Computer Products	133
62	Cecdat, Inc	129, 142
316	CFR Associates Inc	282
117	Chicatrug News	228
32	Cload Magazine	268
100	CompuCover	200
206	Computer Accessory Tech	261
107	Computer Applications Unlimited	290
199	Computer Case Company	265
372	Computer Disc. of America	153
240	Computer Forms	289
22	Computer Info. Exchange	269
130	Computer Plus	121
36	Computer Sales and Service	170
212	Computer Shopper	267
392	Computex	263
9	Computronics, Inc	160-167
498	Compuvest, Inc	289
204	Comsoft	263
497	Connecticut Microcomputers	275
327	Connecticut Microcomputers	74
10	Contract Services Assoc	169
52	Coolidge & Assoc	256
78	Coosol, Inc	212
465	Cornsoft Group	237
99	Cornwall Computer Systems	277
233	Cottage Software	197
298	CPU Shop, The	123
7	Custom Computer Center	195
121	Custom Electronics	198
259	Cyber Innovations	289
*	Cybernetics, Inc	171
161	Dataroyal	74
44	Data Train, Inc	96
274	Data Trans	280
302	Decision Master	95
349	Desert Sound, Inc	77
234	Diaxis Computer Grp. Ltd	298
167	Digital Concepts, Inc	77
313	Digital Data Supply, Co	298
368	Digital Systems Eng	128, 209
440	Discount Software Group	278
88	Documan Software	220
314	Dorsett Education Sys	183
242	Dynamic Software	277
253	Dynatek Information Systems	289
168	EBG & Assoc	74
197	Echo Products	290
202	ECI	298
477	Edu-ware	115
*	80 Microcomputing	50, 106, 107, 112, 178, 193, 218, 245, 285, 301-303
58	Electronic Specialists	262
278	Emtrol Systems, Inc	280
487	Epsilon Systems	174
404	Epson America	41
*	Exatron	Cov.IV
5	E-Z Software	187
141	FEC Ltd	289
12	FMG Corporation	157
39	G & L Software Enterprises	218
203	G P Associates	257
79	Allen Gelder Software	104, 140
75	Godbout Electronics	183
281	Golden Braid Software	290
218	Good-Lyddon Data Systems	248
284	Gosub Software	104
481	J. D. Gramm	290
73	The Graphic Source	271
223	H & H Trading Company	267
125	Hexagon Systems	262
23	Hobby World Electronics	299
401	Holmes Engineering	277
343	Holmes Engineering	77
366	Howard W. Sams & Co	43
103	Howe Software	261
37	IJG	201
*	Info. Tech. Sys	184
348	Innovative Penguin	73
305	Insiders Software	268
2	Instant Software	90, 91, 101, 102, 202, 203, 250-253, 273, 297
246	Interface, Inc	134
319	Interface, Tech	127
287	Interlude	45
193	Joe Computer	114
85	Johnson Associates	291
239	Joseph Bros	277
190	JPC Products	75
230	Kengore Corp	231
375	Krell Software	53
59	L T Data	233
333	LaSalle Computing, Inc	74
198	Learning Place, The	130
14	Level IV Products, Inc	185, 228
391	Lindbergh Systems	297
208	Little Bee Educational Programs	139
53	LNW Research	217
15	Lobo Drives International	Cov.III
334	Lord's Small Systems Design	76
170	M, M, & S Software	77
268	Maine Software	269
332	The Management	76
331	The Management	76
173	The Management	76
87	Management Systems Software	193
90	Manhattan Software, Inc	174
166	Manhattan Softare	77
270	Mark Gordon Computers	285
338	McClintock Corp	76
128	Med Systems Software	214, 215
421	Medfield Computer Software	248
*	Mediamix	256
342	Mediamix	73
272	Mega Systems	184
104	Mercer Systems, Inc	213
20	Meta Technologies Corp	9, 11, 13, 15, 17
71	Micro Applications Pub	59
54	Micro Architect	255
205	Micro Blajak Systems, Inc	289
214	The Micro Clinic	128
89	Micro Learningware	200
72	Micro Management Systems Inc	239
68	Micro Matrix	240
29	Micro Mega	178
310	Micro Mint	295
109	Micro Works	261
476	Micro-80	186
379	Micro Design	114
341	MicroCompatible Inc	76
336	Microperipheral Corp	76
325	Microperipheral Corp	74
378	Microproof/Cornucopia	138
384	Micro Systems Software	6
162	Micro Systems Software	77
360, 362	Microtek, Inc	180, 181
8	Midwest Computer Peripherals	304, 305
112	Miller Microcomputer Services	93
24	Mini Micro Mart Inc	300
98	Minis 'n Micros Inc	200
221	MISOSYS	293
466	Mr. X Consulting Inc	257
451	MTS Enterprises	195
*	MTI	144, 145
144	Mumford Micro Systems	196
142	National Tricor, Inc	287
55	Nautilus	128
135	NDM Designs	203
194	New England Business Serv	282
74	Northeast Microware	290
245	Okidata	24
389	Omega Sales	227
347	Optimal Technology	77
296	Orange Micro	83
376	Orion Instruments	140
308	Ozark Mountain Software	290
370	Pacific Exchanges	199
153	Pacific Office Systems	282
64	Pan American Electronics	171
207	Pensadyne Computer Services	62, 139
408	Percom Data Company	3
1	Percom Data Company	Cov.II
51	Perry Gas & Oil	249
422	Personal Micro Computers	137
*	Phase I Systems	61
346	Phase I Systems	73
273	Pickles & Trout	283
131	Plus Computer Tech	147
127	Pocket Computer Newsletter	277
335	Printel Inc	77
17	Program Store/Realsoft	78, 79
160	Programma Int'l	74
364	Programmer's Guild, The	255
110	Programs Unlimited	225
328	Programs Unlimited, Inc	74
277	Progressive Electronics	269
441	Prosoft	191
269	Quant Systems	199
304	Quarp Publishing	130
350	Queue, Inc	73
41	Racet Computes	111
174	Radio Shack	73
283	RanDob	298
236	Rand's Inc	241
*	Realty Software	289
345	REMarkable Software	76
70	Remsoft	88
499	Remtron	277
276	Richcraft Engineering Ltd	289
468	Rochester Data Inc	249
337	SGL Waber Electric	77
143	Sales Data Inc	257
291	Scientific Engineering Lab	248
50	Select Info. Sys., Inc	154
297	Service Technologies, Inc	281
373	SID	40
19	Simutek	205, 221
91	Sixty Eight Micro Journal	170
329	Small Business Systems Group Inc	77
330	Small Business Systems Group Inc	74
*	SNAPP, Inc	18, 19
494	Soft Sector Marketing Inc	70
434	Soft Sector Marketing Inc	71
495	Soft Sector Marketing Inc	69
496	Soft Sector Marketing Inc	72
299	Software Concepts	63
60	Software Innovations	49
380	Software Innovations	49
478	Software Innovations	49
122	Software Innovations	49
61	Software Innovations	49
289	Softworx, Inc	267
132	Spectral Assoc	209
275	Speedway Electronics	98
438	Stocking Source, The	105
93	Strawberry Software	229
82	Sturdivant & Dunn, Inc	128
150	Sublogic	297
267	Suma Microware	199
151	Sun Research	212
403	Superior Software	198
324	Sybex	46
231	Synergistic Solar Inc	198
139	Syntex Electronic Innovations	127
358	Syracuse R & D Center	261
473	Systemworks	283
148	Tab Sales Company	213
280	Tape Tronics	298
45	Taranto & Associates	135
165	Targonski, Anthony	76
147	Task Computer Applications	125
25	Texas Computer Systems	273
*	V R Data Corporation	232
*	V R Data Corporation	74
137	Van Horn Office Supplies	295
111	Vern Street Products	140
432	Vern St. Prod./The Computer Store	235
340	Vista Computer Co	77
363	Walonick Associates	248
354	John Wiley & Sons	245
279	Wilson Software	257
482	York 10 Computerware	277

*This advertiser prefers to be contacted directly.

READER SERVICE

This card valid until July 31, 1981

Please help us to bring you a better magazine—by answering these questions.

I. What is your age?
- ☐ A. under 18
- ☐ B. 18-22
- ☐ C. 23-40
- ☐ D. 41-60
- ☐ E. over 60

II. What is your occupation?
- ☐ 1. Professional
- ☐ 2. Engineer
- ☐ 3. Data processing
- ☐ 4. Business
- ☐ 5. Education
- ☐ 6. Technician
- ☐ 7. Student
- ☐ 8. Other

III. What are your primary applications of your TRS-80 (check only two)?
- ☐ A. Business
- ☐ B. Games
- ☐ C. Home
- ☐ D. Education
- ☐ E. Scientific
- ☐ F. Control
- ☐ G. Music

IV. Your TRS-80, is it a
- ☐ 1. Level I
- ☐ 2. Level II
- ☐ 3. Model II
- ☐ 4. Don't own one yet

V. What peripherals do you have (check all that apply)?
- ☐ A. Expansion interface
- ☐ B. Disk
- ☐ C. Printer

VI. How much have you spent on hardware?
- ☐ 1. less than $500
- ☐ 2. $500-1,000
- ☐ 3. $1,000-2,000
- ☐ 4. $2,000-4,000
- ☐ 5. $4,000-6,000
- ☐ 6. more than $6,000

VII. How much have you spent on software?
- ☐ A. less than $100
- ☐ B. $100-250
- ☐ C. $250-500
- ☐ D. $500-1,000
- ☐ E. more than $1,000

VIII. What is your level of education?
- ☐ 1. Post-graduate
- ☐ 2. College
- ☐ 3. High school

IX. How many people read your copy of 80 Microcomputing?
- ☐ A. 1
- ☐ B. 2
- ☐ C. 3
- ☐ D. 4 or more

X. If you are not a subscriber please circle number 500.

80 Microcomputing • POB 2743 • Clinton IA 52735

Reader Service: To receive more information from any of the advertisers in this issue of 80 Microcomputing, circle the number on the postage-paid Reader Service Card that corresponds with the Reader Service number on the ad in which you are interested. You will find numbers, preceded by a ✓, near the logo of each advertiser. Complete the entire card, drop into a mailbox and in 4-6 weeks you will hear from the advertiser directly.

1	6	11	16	21	126	131	136	141	146	251	256	261	266	271	376	381	386	391	396
2	7	12	17	22	127	132	137	142	147	252	257	262	267	272	377	382	387	392	397
3	8	13	18	23	128	133	138	143	148	253	258	263	268	273	378	383	388	393	398
4	9	14	19	24	129	134	139	144	149	254	259	264	269	274	379	384	389	394	399
5	10	15	20	25	130	135	140	145	150	255	260	265	270	275	380	385	390	395	400
26	31	36	41	46	151	156	161	166	171	276	281	286	291	296	401	406	411	416	421
27	32	37	42	47	152	157	162	167	172	277	282	287	292	297	402	407	412	417	422
28	33	38	43	48	153	158	163	168	173	278	283	288	293	298	403	408	413	418	423
29	34	39	44	49	154	159	164	169	174	279	284	289	294	299	404	409	414	419	424
30	35	40	45	50	155	160	165	170	175	280	285	290	295	300	405	410	415	420	425
51	56	61	66	71	176	181	186	191	196	301	306	311	316	321	426	431	436	441	446
52	57	62	67	72	177	182	187	192	197	302	307	312	317	322	427	432	437	442	447
53	58	63	68	73	178	183	188	193	198	303	308	313	318	323	428	433	438	443	448
54	59	64	69	74	179	184	189	194	199	304	309	314	319	324	429	434	439	444	449
55	60	65	70	75	180	185	190	195	200	305	310	315	320	325	430	435	440	445	450
76	81	86	91	96	201	206	211	216	221	326	331	336	341	346	451	456	461	466	471
77	82	87	92	97	202	207	212	217	222	327	332	337	342	347	452	457	462	467	472
78	83	88	93	98	203	208	213	218	223	328	333	338	343	348	453	458	463	468	473
79	84	89	94	99	204	209	214	219	224	329	334	339	344	349	454	459	464	469	474
80	85	90	95	100	205	210	215	220	225	330	335	340	345	350	455	460	465	470	475
101	106	111	116	121	226	231	236	241	246	351	356	361	366	371	476	481	486	491	496
102	107	112	117	122	227	232	237	242	247	352	357	362	367	372	477	482	487	492	497
103	108	113	118	123	228	233	238	243	248	353	358	363	368	373	478	483	488	493	498
104	109	114	119	124	229	234	239	244	249	354	359	364	369	374	479	484	489	494	499
105	110	115	120	125	230	235	240	245	250	355	360	365	370	375	480	485	490	495	500

Name _____

Address _____

City _____ State _____ Zip _____

BOOKS

80 Microcomputing
Peterborough NH 03458

Please send me the following 80 Microcomputing products:

Qty.	Catalog #	Title	Unit Price	Total

Add $1 shipping/handling _____

Total _____

Enclosed $_____ ☐ Check ☐ M.O.

Bill: ☐ AE ☐ MC ☐ VISA

Card # _____

Exp date _____ Interbank # _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Please allow 4–6 weeks for delivery

No C.O.D. orders accepted.

5/81

SUBSCRIPTION

80 Microcomputing POB 981
Farmingdale NY 11737

80 Microcomputing subscribers SAVE 40% Subscribe now.

Please allow 4–6 weeks for delivery

☐ New Subscription ☐ Renewal

☐ 1 year—$18 ☐ 2 years—$30 ☐ 3 years—$45

☐ Enclosed $_____ ☐ Check ☐ M.O.

Bill: ☐ MC ☐ VISA ☐ AE ☐ Me

Card # _____ Exp. date _____

Signature _____ Interbank # _____

Name _____

Address _____

City _____ State _____ Zip _____

Canada: $20 1 year only, US funds
Other foreign: $28 one year only, US funds

315B9

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 217 CLINTON IA 52735

POSTAGE WILL BE PAID BY ADDRESSEE

80 microcomputing T.M.

POB 2743
Clinton IA 52735

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 780 FARMINGDALE NY 11737

POSTAGE WILL BE PAID BY ADDRESSEE

80 microcomputing T.M.

Subscription Dept.
POB 981
Farmingdale NY 11737

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 80 PETERBOROUGH NH 03458

POSTAGE WILL BE PAID BY ADDRESSEE

80 microcomputing T.M.

Peterborough NH 03458

Att. Mail Order

Expand your TRS-80*

With The LOBO LX-80 Expansion Interface

Now you can realize all the power and potential of your TRS-80*, Model 1. If it's add-on memory you need, your LX-80 can accommodate up to four 5¼-inch, single- or double-density 35, 40 or 80 track mini-floppies, four 8-inch floppies (single or double sided), and up to eight Winchester fixed disk-drives (5¼". 8", 14").

LOBO's powerful new LDOS™ operating system, provided with your LX-80, allows for the use of any eight drives, in any combination, single or double density.

And there's more ... lots more. There are two parallel ports (standard), two serial ports (optional), a keyboard ROM override switch, and a 32K memory expansion (optional). Send for a free LX-80/TRS-80 cost performance comparison chart.

For the full story on how the LX-80 can expand your TRS-80, see your nearest LOBO dealer, or write or call:

*TRS-80 is a registered trademark of Radio Shack, a Tandy Company.

LOBO drives INTERNATIONAL

LOBO DRIVES INT'L
354 South Fairview Ave.
Goleta, CA 93117
(805) 683-1576

✓15

See us at the N.C.C., booth #4211

To add the speed, capacity and reliability of a disk for only $249.50...

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086

VisiCalc™ is Great! But you need a disk. ES/F "Electric Spreadsheet" $49.95. For Level II and 16K.

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086

TM VisiCalc is a registered trademark of Personal Software, Inc. and Software Arts, Inc.

Exclusive!

All Exatron products come with a 30 day money back guarantee and one full year warranty.

Complete information package—$3.00. Includes Manual, Software Catalogue and list of local Users Groups.

Complete Starter Kit includes ES/F System and Exatron's Software Package. $349.50

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086

NEW machine language ES/F Word Processor System with UC/LC–$24.95. No hardware modification.

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086